THE IRON AGE

New York, May 9, 1929

ESTABLISHED 1855 VOL. 123, No. 19

Puts Steel in Yoke of Liberty Bell

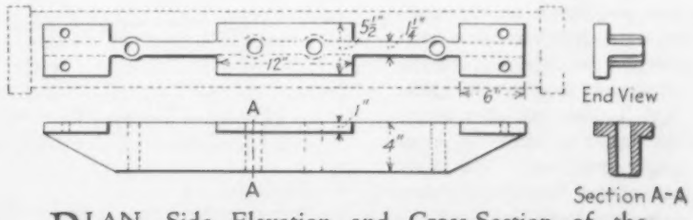
Casting, Hidden within the Weakened 176-Year Old Timber, Designed to Serve Independently of the Wood

THE Liberty Bell, priceless relic of Revolutionary days, has been protected from damage through the possible failure of its yoke. Dry rot in the 176-year-old timber was discovered by Charles W. Neeld, director of public property of the City of Philadelphia, and he asked the engineers of the Franklin Institute, Philadelphia, to decide what should be done to reinforce the wood. Steel castings were put in place at the top and bottom of the yoke and connecting bolts were embedded in the wood, so that only the surfaces of the reinforcing plates and the nuts are visible.

The supporting steel casting weighs 75 lb. and is capable of holding the bell alone, should the wood rot away entirely. The capacity of the yoke, since being strengthened, is about 10,000 lb., and the bell weighs only 2080 lb.

The foundry work was done by the Crucible Steel Casting Co., Lansdowne, Pa. Howard McClenahan, secretary of the Franklin Institute, appointed the engineers who developed the plans for reinforcing the yoke and designed the supporting casting. They included Benjamin Franklin, chairman; Hugo Bilgram, Charles E. Bonine, George S. Crampton and George A. Hoadley.

BOLTS, Passing Through the Wood, Connect the Steel Casting on the Top of the Bell Yoke with Plates at the Bottom



PLAN, Side Elevation and Cross-Section of the Supporting Steel Casting Used to Reinforce the Yoke of the Liberty Bell

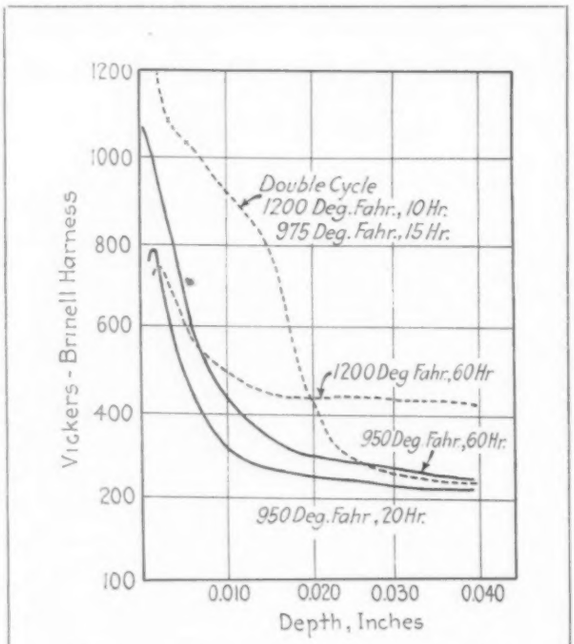
Working Rules for Nitrogen Hardening

High and Low Temperature Cycle Gives Deep Case and File Hard Surface in Eighteen Hours

BY H. W. McQUAID*

CONSIDERABLE publicity has recently been given to the process of nitrogen hardening and as is usual with such publicity, immediate and widespread adoption of this process was predicted. But the subject developed slowly (as is also generally the case) and it was found that the special steels were high in price, hard to get, and the process required a very long time with uncertain results. Metallurgists on investigation found that it was an adaptation of a much older process to a special steel; the important innovation was not so much the process, but the addition of aluminum to the steel to adapt it to the process.

Adolph Machlet, of the American Gas Furnace Co., was granted a patent in June, 1913, for hardening iron or steel superficially by heating it in ammonia above 900 deg. Fahr. This process had only a limited application with ordinary iron and steel; an extremely hard non-corrosive surface can be obtained, but the hardened zone is so thin that it does not offer much resistance to abrasion, even under relatively low unit pressures. Where unit pressures are very light and resistance to corrosion is desired, the Machlet treatment can be used to advantage.



Hardness-Depth Curves for Nitrided Cases Made Under Different Conditions

In 1924 Adolph Fry, of the Krupp company in Germany, discovered that the addition of aluminum, chromium, or several other metals to the steel to be hardened resulted in much deeper zone of hardness. He insisted that the results obtained would not be commercially satisfactory if done at a temperature higher than 1075 deg. Fahr. As described by him, the process required about 90 hr. at 950 deg. Fahr. to produce a satisfactory case. Even at the lower temperature, the case was extremely brittle. The name "nitriding" was given to the process, which indicates that the hardening is due to the formation of metallic nitrides of iron, aluminum or chromium.

It was found later than the addition of a small amount of molybdenum would materially reduce the notch brittleness of the nitrided piece, and at the present time practically all the nitriding steels contain molybdenum. Some of the special nitriding steels contain only molybdenum and aluminum. Others contain chromium and aluminum with a small percentage of molybdenum added to increase the toughness. The exact status of these special steels is somewhat uncertain. Much work has already been done to develop improved steels for nitriding; many new steels will doubtless be developed in the next few years.

The strength of the finished article is of course dependent upon two factors, viz., the strength and toughness of the hardened surface and the strength and toughness of the core after the nitriding operation. If the hardened surface is extremely brittle, a load which fractures the surface will be transferred to the core so quickly that the latter is certain to break immediately. When the core has been properly toughened, and is large in proportion to the thickness of the nitrided case, the case will crack and the core will bend, a type of failure seldom found in pieces case-hardened by the conventional method of heating with carbonaceous materials.

The core strength of the nitrided piece depends upon the alloy and the carbon content. For easy machining prior to hardening it is desirable to have the carbon content low, but for high core strength and the best nitriding results, it is desirable to have the carbon relatively high. To harmonize these diverse requirements, nitriding steels carry carbon from approximately 0.30 to 0.50 per cent. Before nitriding, these special steels will show a yield point varying from 125,000 to 160,000 lb. per sq. in., depending upon the carbon content and the heat treatment. After nitriding at 1200 deg. Fahr. the core strength is reduced. As a matter of fact the strength of the case really controls the strength of the part. Yet it has been the writer's experience that very few engineers, when designing parts made from case-hardened steel pay any attention to the special physical characteristics of the hardened surface, but blissfully make calculations based upon the estimated core strength, and neglect entirely the fact that if the case fails the part must be replaced.

The cost of steels for nitriding is higher than those used for ordinary case-hardening. At the present time one of the best known and well advertised nitriding steels is quoted at approximately 12c. a lb. for small lots, and down to 7c. for requirements of 1000 tons per annum. This compares with approximately 2c. a lb. for low-

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carbon and 4c. for the better grade of alloy case-hardening steels.

But there are many places where the losses in case-hardened products, due to soft spots or warpage, are sufficient to justify the higher cost of the nitriding steel, with its lower losses in the finished article. When nitriding steels compete with the higher priced monel metal and stainless steels, as for pump shafts and valve seats, the total costs are greatly in favor of the nitriding steels. This is particularly true where hardness at elevated temperatures is also an important factor.

Time of Process Varies

NITRIDING usually consists in subjecting the parts to an atmosphere of ammonia at a temperature somewhere between 900 and 1200 deg. Fahr. The time varies greatly, depending upon the temperature, the materials used, and upon the use to which the completed article is to be put. It varies from as low as one hour to as much as 100 hr.

Best results are obtained when the nitriding steel is in a sorbitic condition, obtained by quenching from above the critical range and then drawing below the critical range (generally from about 1100 deg. Fahr.). The ductility of the finished article is then greater, and the nitrided case has a much less tendency to spall. The surface of the piece must also be clean; since some unknown varieties of foreign matter exert a great influence upon the results it is best to prescribe a thorough cleaning either in a boiling caustic solution or in gasoline. Sufficient material should have been machined off to remove any decarburized metal produced during rolling, forging, or heat treatment.

The retorts in which the work is to be treated with ammonia should be made from a material which does not nitride easily; they are usually made of high nickel alloys such as nichrome. Inasmuch as ammonia is expensive as well as irritating, the retort should be sealed as tightly as possible with a special cover, clamped down on gaskets of asbestos or nickel. At the Timken-Detroit Axle Co., a satisfactory seal is obtained with a heavy nickel sheet for a cover, clamped down to the machined surface of the retort, using a small amount of sodium silicate as a seal. In some vertical furnaces the cover has an oil seal, and the work is placed in baskets. This greatly facilitates loading and unloading.

In designing the nitriding department, provide good facilities for eliminating the ammonia fumes, since they are very irritating and drive the workmen out. Insure tight connections from the ammonia tank through to the retort; escaping ammonia from the outlet pipe should be discharged into a small stream of running water. If the retort is taken out of the furnace, special care and sealing devices are necessary; the furnace must also be tightly closed when the retort is in place. At the Timken-Detroit Axle Co., the retort is provided with tracks on the bottom to run on nickel-chromium rollers, and thus move them from the loading position in front of the furnace into the hot chamber. Inlet and outlet pipes for ammonia are brought down close to the front of the furnace, and an asbestos mat provides the tight seal under the furnace door.

Use Sealed Retorts

IF the articles are placed loosely in a furnace heated with electrical resistors, it is well to remember that the resistors will be at a much higher temperature than the other metal in the furnace, and thus the dissociation of the ammonia is increased.

Also remember that considerable time is lost if it is necessary to cool the work in the furnace. This is quite necessary if the work is loose or in the baskets, but not necessary if the steel is placed in movable retorts (unless the "high and low temperature method" to be described later is employed). To avoid long delays a cooling system should be provided to reduce the furnace temperature as rapidly as possible; this will save from two to four hours per run—a very important consideration.

Commercial ammonia, which can be obtained in most cities in 100-lb. tanks, is very satisfactory. The usual method is to pipe the ammonia through a reducing valve to the retort by a rubber hose and thence to a water seal which indicates the pressure maintained in the retort (ordinarily about one inch of water). The flexible hose allows the retort to be moved without breaking the connections. The ammonia tank should have a pressure gage at the reducing valve; the tank must be placed so that liquid ammonia will not enter the system.

Circulation Speeds Up Work

THE process can be speeded up by circulating the ammonia through the work. Apparently the surface of the work tends to become passive unless fresh ammonia continually comes into contact with it. A handy circulating device, due to the Leeds & Northrup Co., is an adaptation of the "Homo" furnace for nitriding. This furnace contains a circulating fan which reverses its direction at regular intervals, and hence keeps up a rapid flow and continuous agitation of the ammonia through the work.

When ammonia is heated in contact with iron, it dissociates into hydrogen and nitrogen to an extent depending upon the temperature; this effect should be kept to a certain minimum. Whether the important factor in hardening is the dissociation of the ammonia or the flow of the ammonia is not certain, but it seems that a constant degree of dissociation is not an important factor. If, then, contact between the work and undissociated ammonia are the most important factors, the percentage of undissociated ammonia in the retort and the circulation should be under control. It further follows that with a high degree of circulation the dissociation can be relatively great without any adverse effect on the work itself. Thus we have found that nitriding at 1200 deg. Fahr. (where the dissociation is hard to keep below 50 per cent) is satisfactory providing the flow of ammonia through the work is sufficiently rapid; satisfactory results have also been obtained with not more than 30 per cent of undissociated ammonia in the retort. A simple apparatus should be set up to determine the percentage of undissociated ammonia coming from the retort.

Combination Cycle Gives Best Results

ACCORDING to Fry, no nitriding should be done at a temperature above 1075 deg. Fahr., else the marginal layers will be brittle and tend to peel off. For this reason, most nitriding is being done below 1000 deg. Fahr.; the time required is often as much as 100 hr., and the resultant nitrided zones are relatively thin but extremely hard.

It is possible to obtain good results at higher temperatures; in fact, some of the toughest and most satisfactory cases have been nitrided at 1200 deg. Fahr. It has been my experience that as the temperature increases from 900 to 1250 deg. Fahr. the surface hardness decreases, but the depth is greatly increased. Twenty hours at 1200 deg. Fahr., while it does not give a case which is as hard as would be obtained at the lower temperature, will give a very much deeper one than a period of say 90 hr. at 950 deg. Fahr. The figure shows depth-hardness curves determined at the Timken-Detroit Axle Co. Here we use a 10-hr. period at 1200 deg. Fahr., followed by 15 hr. at 975 deg., which produces Brinell hardnesses as high as 1200 at the surface and 800 at 0.015 in. below.

If the ammonia is circulated, the time can be still further reduced to a 6-hr. period at 1200 deg. Fahr., followed by 10 hr. at 975 deg. Fahr., and a total cycle

of approximately 18 hr. If the main object is a non-corrosive surface, such as in a pump shaft, the nitriding cycle can be reduced to a few hours. Molybdenum-aluminum steels seem to require a higher temperature than the chromium-aluminum steels.

If the surface at the finish must be free from discoloration, it will be necessary to cool the work in ammonia down to not more than 350 deg. Fahr., else the pieces will have a blue oxide finish, which in itself is softer than the nitrided case beneath. When removed from the nitriding furnace or retort the work should be light silvery gray, very smooth and absolutely file hard. This is one of the best indications of good results. A dusty or powdery finish indicates that cleaning of the surface or circulation of the ammonia has been neglected. If the surface is satisfactory, but very thick and underlaid with a very soft zone, it is because the hydrogen has been more active than the nitrogen, and circulation of the ammonia has been too sluggish.

The surface should not only be hard, but tough. The edges, if they possess even a very slight radius, should not flake when pounded with a hammer, and flat surfaces should resist the peen end without cracking. If a section is ground and etched in nitric acid solution, the nitrided case will be developed and its total depth can be ascertained easily. A depth indicated by the etch is, however, not indicative of the actual depth of file-hard material, as this is seldom more than 0.010 in.

Careful measurements will show that warpage is commercially negligible, even with intricate parts, although nitriding increases the size approximately 0.001 in. per in. of diameter. This growth is quite uniform, and can be allowed for in the design.

Nitriding can be done on any part subjected to heavy abrasive loads, and in fact where even case-hardening is now used, with the possible exception of heavily loaded carburized parts now made of such steels as 5-per cent nickel steel. Nitriding steels are less resistant to concentrated shock loads than are the high-alloy case-hardening steels, but in such parts as wrist pins, timing gears, worms and journals, the nitrided article is superior to the case-hardened article. It is in everyday commercial production on parts such as pump shafts, vacuum-cleaner beater bars, valve seats to withstand high temperature and pressures; for airplane engine timing gears and hundreds of parts requiring the highest degree of hardness with the least distortion. One consumer alone requires approximately six tons of nitriding steel per week to satisfy his requirements.

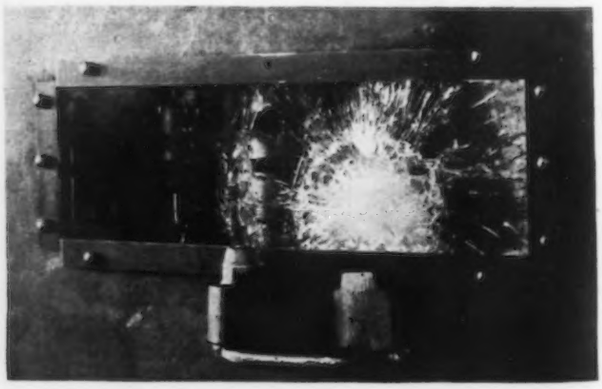
For such parts as bearings and gears which now use most of the case-hardened high-grade alloy steel, nitriding has still to be successfully demonstrated. As remarked above, nitriding steels are much more difficult to machine due to high alloy and carbon content. However, several well known European automobiles are said to contain ring gears and pinion of nitrided chrome-aluminum steels.

It must be admitted that some very poor results have been obtained with nitriding, but I believe this has been because some simple factor in the process has been neglected. It is also well to remember that the nitriding art is in its infancy.

Equips Drilling and Hobbing Machines with Safety Devices

IN the drilling of pieces made of special steel, one of the departments of the General Electric Company's River Works at West Lynn, Mass., encountered considerable difficulty from flying chips. These chips were a continual source of danger to the workman at the machine and also to passersby; in addition the fallen chips scattered upon the floor proved dangerous as well as unsightly. These hazards were eliminated by applying to the machine the chip breaker and guard here illustrated. The guard prevents the chips from scattering, while the chip breaker keeps them in one position on the table.

A bullet-proof shield for hobbing machines has also proved effective. This device, used at the company's Pittsfield Works, serves to protect the operators from flying particles of the hob or mold case. Previously the sight holes were covered with expanded wire mesh, but this was found to interfere with visibility, and to fail to provide complete protection. Since the installation of the protective window of bullet-proof glass two serious accidents have been averted. In one of these cases a 12-oz. piece of a hob, shown at the right-hand side of the handle in the illustration herewith, shattered the inside, but not the outside lamination of the glass.



The Chip Breaker and Guard at Left Eliminates Hazard of Flying Chips in Drilling Special Steel. A serious accident was averted by the bullet proof glass shield, above, installed on hobbing machines

Principles of Materials Control

Forecasts Based on Performance and Schedule Need Frequent Revision—Effect of Engineering Changes

BY HOWARD H. FLAGG*

DURING the past ten years an intense interest in inventory turnover has manifested itself. One of the results has been the development of so-called hand-to-mouth buying. Thus a new phase of business conduct has come to form an important part of management, and the systematic purchase and delivery of materials has become one of the vital functions of every manufacturing concern. Where formerly it was believed sufficient to have plenty of material at all times, it is now demanded that not only must we always have sufficient, but that we must never have too much.

Such conditions cannot be attained without careful planning. To this end, it has become the practice of most manufacturers to formulate in advance a tentative program for each year's output. This is necessary to provide new designs, plant equipment and personnel, as well as to make provision for materials.

Were it possible to make such plans accurately, these problems would become simple. But, unfortunately, few can predict the future course of business a year in advance, and it becomes necessary to revise estimates from time to time. So there has been developed the idea of monthly forecasts.

Forecasts Three Months in Advance

Many raw materials have to be purchased three months ahead of time, so these forecasts usually include the probable requirements that far in advance. The data for these estimates include figures from the field organization of the sales department and the quantities sold in corresponding months of former years. Every item of information at the command of the organization is utilized in formulating the forecast. Each month the forecasts made the previous month are reconsidered, and if necessary revised, so that there really are three forecasts of each month's business. The first two are used for purchasing information, and the last to plan production and determine delivery dates.

These forecasts are in terms of finished units or models. As such they are of no use to the purchasing department. It is the duty of the material control department to translate them into purchasable items and to determine the quantity of each to be bought.

They must know how many castings, forgings, stampings, etc., are required for each unit and how much of the various kinds of bulk stock will be needed. This information must be sent to the buyers with the least possible delay. To go over blueprints each time would require too long. Therefore, they have recourse to parts lists furnished by the engineering department and a usage record showing the quantity of bulk stock needed for each fabricated part, the latter usually furnished by the production engineering department or a similar organization.

In addition to the quantities needed to meet the forecast, there are service requirements, replacements for scrap and other extraneous items, all of which must be listed and combined. At this point it becomes necessary to describe briefly the clerical methods involved in keeping track of material transactions.

The main functions to be observed are:

1. Compute requirements of all kinds,
2. Cover the requirements with purchase requisition,
3. Determine delivery dates,
4. Receive the materials,
5. Disburse them to the factory,
6. Keep records of all diversions for service, scrap, etc.

In consequence the following data must be available at all times:

a. Quantity of each item required,
b. Quantity of each item requisitioned.

In addition to this information, it is necessary to know at certain times

c. Quantity of each item received,
d. Quantity of each item disbursed for production, scrap, service, etc.

To make an economical division of labor, these figures are usually embodied in two records. The more important and the more difficult work is done by highly trained men and consists of items (a) and (b), requirements and requisitions. Receipts and disbursements of material are recorded from receiving sheets, scrap tickets, shipping records, etc., by less experienced men or by girls. The first record is known as the requirement record and the second as the stock record.

It is highly desirable to maintain all records on a purely mathematical basis, and to that end the cumulative method is in general use. This cumulative principle simply means that, instead of regarding each requirement as an individual problem, to be carried all through the various steps of ordering, receiving and disbursing, all requirements for the same item are added together as they recur from time to time, and totals thus built up are maintained on a comparative basis. These accumulations start from one of two points, either Jan. 1 or the commencement of a manufacturing season. By the use of this cumulative method the following facts are always available:

1. Total requirements less total requisitions are quantities to be ordered to meet schedules.
2. Total requisitions less total receipts are open orders.
3. Total receipts less total disbursements are inventory figures which may be checked by physical counts.

We return now to the requirements as computed from the forecast and service requisitions. Each requirement for production is entered on its appropriate card in the requirement record. There may be several entries made for one commodity, if it is used on more than one model. These are cumulated to form a production total. To this

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total are added requirements for service and allowances for scrap to form a gross total requirement. A requisition is then made to equal this gross total requirement and sent to purchasing department.

Each month when new schedules are broken down the production requirements are added to the previous production totals and these cumulatives, added to the new cumulated service requirements and scrap replacements, form new gross totals. Comparison of the new gross total requirements and previous total requisitions shows the quantity necessary to buy.

Keeping Track of Stock

As materials are received at the plant they are entered on the stock record. These entries also are carried cumulatively. Thus if the total receipts shown on the stock record are subtracted from the total requisitions shown on the requirement record, the difference indicates open orders.

In some plants it is desirable to know the quantities in raw stock. When this is so, all disbursements from stock to factory are entered on the stock record and cumulated. The disbursements to service and those for the replacement of scrap are entered and carried in the same way. The difference between the total of all these disbursements and the total receipts is the balance in raw stock.

It is from this record that disbursements for scrap are obtained, to be included as replacements on the requirement record.

When it is necessary to know how much of any commodity is in the entire plant, total shipments are broken down and the individual items added to disbursements for scrap, service, etc. This total subtracted from total receipts gives the desired total in the plant. Similarly, the total shipments plus total scrap, subtracted from total disbursements to the factory, gives total work in process.

Necessity for Monthly Revisions

Requisitions sent to the purchase department are many of them for material needed several months later. Delivery dates are carefully specified, but even the most conscientious consideration cannot indicate these shipping dates with perfect accuracy, due to inevitable changes in schedule, and they have to be revised from month to month.

The foregoing is a brief outline of the principal routine functions of the material control department as regards productive materials. The handling of expense items is similar. Many of them are in direct proportion to production schedules. This includes such commodities as drills, reamers, standard cutting tools, lubricants, cutting compound, wiping rags and rubber gloves. Supplies of various kinds are customarily handled on a maximum and minimum basis.

This is not the occasion for a more detailed description. As stated, the object is to relate the engineering department to these activities.

Effect of Changes and Irregularities

This sketch of what goes on in the material control is almost an ideal in the light of actual procedure. In reality, probably one-half the work performed in the department is brought about by changes and irregularities of various kinds. The two leading causes of extra work are schedule changes and engineering changes. Schedule changes are generally due to unlooked for business conditions. They frequently cause as much work as an entirely new forecast.

Engineering changes, so far as the material control is concerned, are of two classes: those which can be put into effect when convenient or at a future date considerably in advance, and those which must be made immediately. The first class causes little trouble beyond the work incidental to balancing out the raw stock and work in process. The second class is the bugbear of the department. In many instances material on order has to be canceled, and new material secured. It often happens that this is difficult to accomplish and the results are not satisfactory.

Lack of Coordination Frequent

As the average material control department today realizes that without change we cannot progress, it endeavors to treat the matter philosophically. There has been marked improvement in the methods of transmitting engineering changes and in handling them when received. The greatest difficulties which still exist to any extent are caused by lack of mutual understanding of the problems and methods of the two departments.

It is sometimes hard for the material control to understand why changes are necessary after a year of experimenting, and equally hard for the engineering department to understand why some apparently insignificant change should affect the material situation. The best solution to date is the appointment of a man who has had actual experience in both departments, to perform a definite set of duties, as follows:

a. Act as a consultant for engineering department when changes are contemplated.
b. Interpret all changes actually determined upon to the material control department.
c. Embody these changes in material control records.
d. Maintain close observation of bulk stock scrap in the factory, resulting from punch press, screw machine and similar operations, to make sure that the most economical sizes of the bulk stock are being used.
e. Watch the factory operations in general to see that they are done in accordance with standard practice.
f. Familiarize himself with changes in manufacturer's standards of sizes, limits, gages, etc., and keep both departments posted.

This man should work for the material control department, acting as a consultant for that department, the engineering department and the purchase department.

The importance of standardization is now so well accepted that little need be said on the subject. It is well to remember, however, that standardization should start in the engineering department. When suggestions along this line originate in the material control, the factory or the purchase department, they involve engineering changes. The principles to be kept in mind are:

1. Utilize standard shapes, sizes and limits for bulk stock.
2. Use smallest possible variety of standard purchase parts.
3. Make fabricated parts used in various models and sizes of products interchangeable, whenever practicable.

Confusion Regarding Parts Numbers

A fruitful subject for discussion is found in the assignment of parts numbers. Parts numbers are used principally because they eliminate the time and work required to write out names and because they afford an absolute means of identification. To the material control department, the importance of this latter qualification is enormous. The identification of each part and assembly must be absolute to avoid confusion. Issuing parts numbers for a new product is a comparatively simple matter. The difficulties arise when a change is made in a part for which a number already has been assigned.

There is a fairly widespread impression that when the new part and the old part are mechanically interchangeable no new number is necessary. This, however, is apt to be incorrect. There is a period of time subsequent to the issuance of an engineering change when both parts have to be dealt with. This period continues until all old

parts are out of existence, so far as production is concerned. It is during this time that trouble occurs.

To illustrate, we will assume that a bronze casting has to be made harder. To this end, the specification for bronze is altered. All dimensions remain the same. To the average eye, the outward appearance is no different. When completed, the new part and the old part will be interchangeable, both mechanically and visually. Let us assume, then, that no new number is issued.

When the Old Number Is Continued

After receiving the engineering change in the material control department, the first consideration is to get it into the material control records. To do this, the date when the new part is to go into production is determined and written notations are made on the requirement record, the parts list and the stock record, which will indicate the specification change, date effective, etc.

A purchase requisition is then made. At this time there are usually purchase requisitions, purchase orders and invoices for the old part still extant, and correspondence between purchase department and vendors relative to the old part still are necessary. This condition may continue for several weeks, with misunderstandings practically certain to ensue.

In due time the new parts begin to arrive at the plant and different receiving inspection methods are demanded. The new castings are practically indistinguishable from the old. Receiving clerks become confused. No one feels sure of what is being handled. There is doubt as to whether this is the often recurring overshipment of the old part, or the first shipment of the new. A study of invoices is not always conclusive. More confusion follows.

When new machining methods are necessary the shop becomes involved and loss of material and time ensues. The foregoing picture is not exaggerated nor is it infrequent. The same conditions are experienced when changes of bulk stock, such as steel sheets, bars, wire, etc., are made. Almost all of the trouble could be avoided by the assignment of a new number.

The most satisfactory policy we have found thus far is:

1. Issue all part and assembly numbers through the engineering department.
2. Issue bulk stock numbers through the material control department.
3. Issue new part number when one or more of the following characteristics change:
   a. Mechanical interchangeability.
   b. Material.
   c. Appearance—by which is meant change in appearance which could confuse receiving clerks or inspectors in the rough, or assembly department when finished.

The above is written advisedly, with a full appreciation of the added number of blueprints to be kept on file, and the extra work in the drafting room, which, by the way, frequently is compensated for by added certainty and less checking when new combinations of parts are required. Absolute identification is as valuable in the drafting room as it is in the material control department.

In summarizing the relationship of the engineering department to material control, there are four things to be desired:

1. Clear and comprehensive parts lists, logically arranged.
2. Engineering change notices which are explicit and definite.
3. Generous use of part and assembly numbers.
4. A realization that time is of prime importance in effecting engineering changes and that, in consequence, advance information is frequently valuable.

Aluminum-Silicon Alloys for Deoxidizing

IN making killed steels it is common practice to add both silicon and aluminum as deoxidizers. The usual method of addition is to use the silicon as 50 per cent ferrosilicon and the aluminum as stick aluminum thrown into the ladle or as shot aluminum fed into the molds. At the Pittsburgh Experiment Station of the United States Bureau of Mines, Department of Commerce, a study is being conducted, in cooperation with the Carnegie Institute of Technology and the metallurgical advisory board, on deoxidation of steel with aluminum-silicon alloys in order to find out the best method of deoxidizing with aluminum and silicon.

When there is only a small amount of aluminum in the alloy the inclusions formed are similar to those formed on deoxidation with silicon alone. As the aluminum in the alloy increases, the type of inclusion changes from a large glassy particle to a small particle which has some glassy characteristics but is in the main the amorphous type. These particles show high segregation at the top of small ingots and appear to coagulate in the steel much in the same manner as alumina. However, they segregate in the ingot proper quite differently from alumina because the particles are somewhat larger than the alumina particles. Even when the silicon content of the alloy is dropped to 8 per cent the inclusions still show a considerable tendency to coalesce. If the deoxidation product can be made to coalesce somewhat, its chances of being removed from the steel are much better than deoxidation products which remain as a colloidal suspension, as is the case in deoxidation with aluminum alone. The ingots killed with these alloys showed an extremely low iron oxide content.

Delicate Tests for Chromium Compared

THERE are rather delicate tests for chromium which are quite important in many lines of industry where chromium is used. These have been compared by Norman M. Stover, of the University of Alberta, Canada. Two tests which he compared are the ether-hydrogen peroxide test and the diphenylcarbazide test. He found the latter to be much more sensitive than the former. Results of the work were published in the *Journal* of the American Chemical Society, and a brief abstract follows:

When a dichromate solution was acidified with sulphuric acid and shaken with ether, a positive reaction for chromium (blue color in the ether layer) was given by as little as one part of chromium in 1,250,000. Portions of the dichromate solution were acidified with certain acids, and a solution of diphenylcarbazide in alcohol containing 10 per cent of acetic acid was then added. A positive reaction for chromium was the production of a color in 10 min.; the color depended upon the amount of dichromate present, being deep red with relatively large amounts and a distinct violet with small amounts. The minimum amount of chromium detected by the diphenlycarbazide was one part in 12,500,000 in the presence of citric acid, one part in over 71,000,000 in the presence of acetic acid, and one part in 100,000,000 or even 250,000,000 in the presence of sulphuric acid.

When these tests were applied in the usual course of qualitative analysis, the minimum amount of chromium detected by diphenylcarbazide was about one part in 1,000,000 in the presence of acetic acid, while the ether-hydrogen peroxide test failed to show the presence of one part in 250,000.

Problems in Operating Gray Iron Foundries

Sand Control, Gating, Cupola Operations and Coke Tests Covered from Many Angles—Unique Sessions at Foundrymen's Convention

ONE of the features of the annual convention of the American Foundrymen's Association at the Stevens Hotel in Chicago, April 8 to 11, was two courses in gray iron foundry and steel foundry shop operations. They were held each afternoon of the four days simultaneously at four o'clock, and were presided over by prominent foundrymen. Large attendance and keen interest in the general discussion of foundry topics characterized these meetings, and they were a decided success.

In THE IRON AGE of April 18, pages 1076 and 1077, was published a brief report of the sessions covering the steel foundry. In the following paragraphs are presented a report of the sessions on gray iron shop operation, as well as a résumé of the meeting on sand control, which was held Tuesday evening, April 9. This is included with the account of the shop operation courses because sand control was also the subject of one of those informal meetings.

How Molds Should Be Gated

GATING molds was the subject introduced at the opening session of the gray iron course, presided over by Harry W. Dietert. He explained his method of determining the cross-section of the gate as developed from various mold and castings' section dimensions. The formulæ obtained answered perfectly for his line of work —radiators—where there are narrow ranges of metal thickness and the sections uniform.

Discussion brought out the fact that, for irregular sections, no set formula would work out, and that only the experience and skill of the foundryman could be depended upon to get satisfactory results. The subject of strained molds, the cutting of the sand, forced pouring, etc., came up duly, but in the end the meeting settled down into giving experiences with internal shrinkages in castings as related to the position and size of the gates and risers.

As would be natural, the diversity of opinion was large, Eugene W. Smith, Jr., Hougland & Hardy Co., Evansville, Ind., holding that risers were not necessary, and foundrymen making heavy castings holding the reverse. He presented a piece of a defective casting and a lively debate resulted over the cause of the trouble The blackboard was filled with sketches of castings with internal shrinkages and suggested proper and improper gating, the position of chills, the insertion of nails and lumps of cast iron to cause faster setting, and other methods of helping over the difficulty.

Dr. Moldenke explained the nature of shrinkage formations, in that it was impossible normally to feed a mold slowly enough to insure sound metal—the volume of molten metal being reduced from 5 to 12 per cent in solidifying—and that therefore soundness in any casting could not be attained, though much could be done to mitigate the difficulty of artificial aids, causing the iron of the thicker portions to set as fast as the thinner ones. The advent of lunchtime shut off the rambling debate, and it would have been part of wisdom to have had a classification of the debatable points as part of the program, to save time and get more definite facts for the large gathering attending this meeting.

Fundamentals in Sand Control

SAND control fundamentals was the main subject at the second session of the course, under the chairmanship of Major R. A. Bull. This was the most largely attended meeting in the history of the A. F. A.—about 750 members assembling in the great ball room of Hotel Stevens.

W. F. Graham of the Ohio Brass Co., Mansfield, Ohio,

Foundrymen Who Participated in the Sessions

F. K. VIAL

E. F. WILSON

R. F. HARRINGTON

W. F. GRAHAM

gave the first paper, describing the method of handling and reconditioning the sand used in his foundry. About 50 tons supply the molders of 15 floors in this system, and the turnover of the sand is hourly, so that cooling and aeration are given particular attention. The line of castings is light, the actual average weight being 0.93 lb., a 3-in. valve casting being the largest. About one ton of new sand goes in every day. The great number of cores used makes the removal of the prints a serious problem. Otherwise the system is the usual one of conveying and re-tempering, with re-conveying to the overhead bins or sand-chutes of the molders.

Sand Control in a Malleable Foundry

W. Ranis of the Union Malleable Iron Co., East Moline, Ill., gave the next paper, on sand control in a malleable foundry, where thorough sand testing is used, but a limited sand control is exerted over only a portion of the molding floors. Where it is carefully controlled, sharp sand and clay are added as either may be required, and particular attention is given the patterns, for it was found that in the lifting out of patterns much damage can be done to the sand by tearing away particles. This testing and even only partial control of the sand heaps has resulted in better work made and smaller losses of castings.

Here also the core-print question had to be watched carefully, as otherwise the heaps would grow while losing strength at the same time, necessitating rebonding by clay addition. Further, the sand heaps would coarsen up seriously, which meant rougher work. The cost of this sand testing and supervision meant the addition of one man to the regular pay roll, caring for the work of 83 men on the molding floor. The tests made were the usual American Foundrymen's Association standards.

Controlling Sand in a Gray Iron Foundry

Requirements in specifying for molding sands are different from those in using these sands after they are received, said R. T. Harrington, Hunt-Speller Mfg. Co., Indian Orchard, Mass., for the character of the sand is quickly changed when the new is mixed in small quantity with the used material. Since sand free from clay, as well as clay for reviving the bond, are now generally used in some quantity, special specifications for these are now needed. In fact, great attention must be paid to the continued use of clay for strengthening the bond, as otherwise the scrap heap will soon show that this has been overdone.

Effect of sea-coal in the sand is also serious, acting like a silting up of the sand with permeability troubles following. It has been found that careful sand control actually fixes the number of jolts within narrow limits in making molds, and is consequently very valuable in its results. Finally, Mr. Harrington described the recent advances of the American Foundrymen's Association sand committee in improving testing methods and apparatus.

Reducing Number of Bad Castings

Reduction in scrap was reviewed by Eugene Smith. He emphasized the importance of permeability in the sand used, and said most of the troubles of the foundrymen today hark back to sand defects. In his own shop practice, with exceptionally low losses in castings—making valves and fittings—even here most of these could be traced back to the sand and its abuse by the molders. Further, the importance of the bond was brought out, and what this means in new sand where much of the clay is collected in small balls which, if worked into the heap, might give too much bond for good castings. Here the repeated use of the sand for molds would gradually reduce the strength of the bond and restore the permeability again. Considerable discussion followed until adjournment.

Special Papers on Sand Control

AN evening session on practice and development in sand control, under the chairmanship of Major R. A. Bull, was opened by a report of the committee on molding sand research, presented by Prof. H. Ries of Cornell University, chairman of the committee. He described the general progress of the work and indicated future developments. His report was followed by the reports of a number of sub-committees of which the chairmen respectively gave the details of such improvements in existing methods of sand testing as had been made during the past year. They also outlined the tests directly ahead. These tests, and the specifications to result therefrom, embraced the above-mentioned need for tests on clays for reviving the bond in molding sands, the testing of core sands and the present status of synthetic sands. In the discussion much attention was paid to steel sands and the methods of making this material, as well as purchasing the silica base and the binders.

R. F. Harrington, as chairman of the sand reclamation committee, outlined the status of results obtained by a number of foundries, both in re-bonding the sand used, making synthetic sand with the prepared old material, as also with fresh material. The very considerable economies thus resulting were dwelt upon, and the fact pointed out that, in the general inquiry made, but a small percentage of reports received proved unfavorable to the idea of bond improvement as a general proposition, though care would have to be exercised in not overdoing the matter.

After considerable further discussion as to details of the inquiry on the reclamation in question, the floor was given to R. W. Kurtz of James B. Clow & Sons, Chicago, to read a paper on sound castings. E. F. Wilson of the Jefferson-Union Co., Lockport, N. Y., in his paper, "Some Experiments in Sand Control," discussed his suggested "hot permeability" test, he having found that hot sand loses its permeability proportionally as the temperature the sand is subjected to rises. He was urged not to overdo this, as "red-hot" has no particular interest to the foundryman so far as permeability is concerned.

New Data on Refractory Sands

J. F. McMahon of the Department of Mines, Ottawa, Canada, then gave a paper on the "Refractoriness in Foundry Sands," which was of great interest. He gave much tabulation of results of fire-tests on molding sands. Finally R. F. Harrington, reading a paper for its absent author, on sand-handling installations, and explaining some 20 slides of existing installations, closed up the work of the evening session, which adjourned at 11.15, with those attending thoroughly exhausted.

Cupola Control and Allied Topics

THE third session in the shop operation course, held on Wednesday, was presided over by J. T. MacKenzie, and was devoted to cupola control and allied questions. A program had been arranged which facilitated the orderly progress of the exchange of information.

Steel Scrap in the Cupola

David McLain took as his subject the use of steel scrap in the cupola, telling of his first tests in this direction, with a resulting practice of 70 per cent pig and 30 per cent steel scrap. The discussion which followed went into the thickness of section, whether laminated steel in bundles could be used, rails of heavy head-sections, etc.; also the position of the steel in the charges of the cupola. From ¼ in. to 1 in. thickness was considered best for the scrap sections, and putting the steel on

the coke, with pig and cast scrap on top, was held as the best method of charging.

Fluxes for the Cupola

Cupola fluxes and raw materials formed the subject of the next address, by G. S. Evans of the Mathieson Alkali Works, New York, in the course of which he described how the coke in burning is covered with a slag of the ash contained. This prevents a further rapid attack of the oxygen of the blast and, unless washed away by a very fluid fluxing reagent, will retard the melting operation. Limestone, if over 95 per cent calcium or magnesium carbonates, does this washing-off process, fluorspar thins the slag formed, and soda ash gives still more fluidity. Mr. Evans had found that best results are obtained when a double dose of limestone or flux is put right on the bed coke at the start.

After a further discussion on the merits of manganese compounds for removing sulphur, the floor was given to E. J. Lowry, consulting metallurgist, Detroit, who spoke on pig irons in a general way. He emphasized the unavoidable irregularities of ore reduction in the blast furnace, the size of coke as charged, the carbon absorption, the best size of pigs made and the consequent melting points in large and small pigs.

Further Tests on Coke Necessary

Chairman J. T. MacKenzie then took up the subject of coke and pointed out the necessity of further tests on its quality, particularly the rate of combustion, the temperatures at which the different varieties will catch fire, the improvement of cupola operations by uniformly-sized pieces, and the possibility of improving the quality of the fuel by the removal of the soft ends.

Petroleum coke, and its varieties as to different degrees of strength, came in for much discussion, which also embraced the behavior of steel when part of the coke charges contained this very high-carbon fuel. The meeting was exceptionally well attended, and had the advantage in that a carefully divided program and selected speakers were arranged for in the presentation of subjects, thus giving the discussion more direction.

Fuel Combustion in the Cupola

THE final session in the shop operation course at the close of the convention was presided over by C. J. Scullin, St. Louis Gas & Coke Corporation, St. Louis. The fuel combustion question in cupola melting was the first subject. It was presented by F. K. Vial, who went through the several phases of the subject, giving the fundamental figures involved. He asked that more attention be given the waste gases of the cupola, as taken below the point at which the air entering the charging door would affect them. A recording system giving the percentages of carbon dioxide, carbon monoxide, and possibly free oxygen would indicate what was going on down in the melting zone, and provision could be made in charging to correct the height of the bed—by putting on extra coke, if necessary, and slowing up the blast until this extra coke would have reached the bed. Many points were touched upon in the discussion, among them the relative heights of different diameter cupolas, and the tuyere and cupola areas as proportioned similarly.

Gas Preferred for Lighting a Cupola

Work of the session was completed by the chairman by a discussion of how to light up a cupola properly—his own preference being gas, instead of wood or oil; the absorption of sulphur by the slag and a study of the character of the scurf found on top of machine cast pig iron. These are not at all as dangerous as the foundryman may think, for the iron content of a perfectly clean pig of a cast was found to be 92.5 per cent, whereas that same cast had badly scurfed pigs in which the iron content was 92 per cent—the scurf represented half of 1 per cent, and moreover contained 0.41 per cent calcium—or actually helped to flux the impurity.

Special Alloys Reduce Weight of Battleships

AT a meeting of the British Institution of Naval Architects held in London, March 20, Sir William Berry read a description of the new battleships Nelson and Rodney. While these ships mount nine 16-in. guns, and carrying the unprecedented thickness of 6¼-in. deck armor against plunging shell and airplane bombs, they conform to the Washington treaty requirement of 35,000 tons maximum standard displacement.

"The problem of weight reduction was attacked in two directions—firstly, the general design of the ship was so disposed as to give the maximum effectiveness to armor and armament within the smallest possible compass; secondly, by close attention to the details of structure, machinery and fittings, to eliminate all non-essential parts, and to use the lightest materials appropriate to the work. By careful consideration of all details (involving the redesign of many standard fittings), and by tightening up the supervision of manufacture, a large measure of success was achieved. One of the most fruitful sources of weight economy was found in the employment of 'D' quality steel in place of the 'H.T.' quality formerly used by the British Admiralty for the principal strength members of the hulls of heavy warships.* This steel has an ultimate tensile strength of from 83,000 to 96,500 lb. per sq. in., with a minimum elastic limit of 38,000 lb. per sq. in.; about 6500 tons of this steel was used in the hull structure of each ship, and by using it higher stresses were accepted, with consequent reduction of sections. The specified rolling limits were also amended to insure that no plates or sections supplied should be above the weight ordered. Extensive use was made of aluminium and its alloys in the manufacture of minor fittings and of such articles as kit lockers.

"A number of different alloys were employed, some to proprietary formulæ and some of Admiralty specification, and experience so far has shown that in the main they have fulfilled their purpose. With further improvements in design and material, these alloys should have very many useful applications for fittings not exposed to the weather, nor subject to very rough usage. For outboard fittings, which are exposed to the corroding influences of sea air and spray, the results have so far been disappointing, even though protected with paint, and it is evident that further developments will be necessary before a really reliable light alloy for such work is obtained."

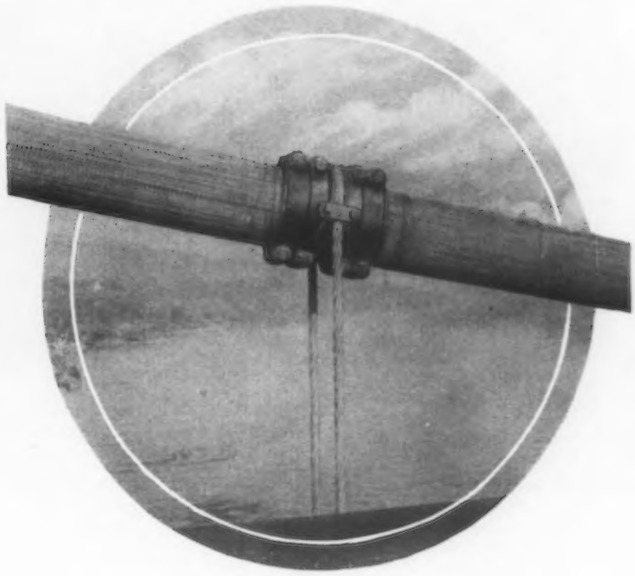
Each of the revolving triple turrets weigh nearly 2000 tons. There are also over 300 miles of electric cable on each ship.

Replying to a question as to whether D-quality steel was not more brittle than the mild structural steel, the author said the D-steel had practically the same working properties as mild steel, but required careful handling when heat treatment was necessary.

*A description of the development of this steel was given in a paper entitled "Steels for Shipbuilding," read by Sir William Berry, before the Institution of Civil Engineers' Engineering Conference, 1928 (see THE IRON AGE, June 28, 1928, page 1813).

Manufacture of Bridge Wire

THE Main Cable of a Suspension Bridge Is Made of Thousands of Strands of Cold Drawn Wire, Laid Parallel to Each Other —Wire for the New Hudson River Bridge Is High-Carbon Acid Open-Hearth Steel Made of Boiler Plate Scrap and Manganese-Bearing Pig Iron



ALL Departments Institute Practices Calculated to Insure Best Degree of Uniformity, End to End of Each Coil, and Coil to Coil — Drawing a Rod Into Wire Is a Test for High Quality, But Both Ends of Each Coil Are Given Tensile and Bending Tests at Several Stages

BY E. E. THUM

INSPECTION of the processes used by John A. Roebling's Sons Co. to manufacture the bridge wire for the mammoth suspension bridge now being built across the Hudson River at New York leaves the observer with the feeling that the ideals of the steel cable maker must be highest quality and absolute uniformity. Many items of good practice are enforced; continuity of personnel, operation, inspection and testing also lend themselves toward these ends. It might be mentioned that a cross country rod mill has recently been superseded by a continuous mill in the plant at Roebling, near Trenton, N. J., so that the physical properties of the leading end of a rod 1000 ft. long might be more nearly like those of the trailing end.

As may perhaps be well known, a bridge wire is one of the elements which, laid side by side, forms the huge cables giving the main support for suspension bridges. It is a material which safely carries year in and year out a greater load per unit area than any other structural material.* Its high strength is usually ascribed to the cold drawing which the wire gets; but this tells only part of the story.

There is not space here to recount the history of the suspension bridge in America. However, it is proper to mention that John A. Roebling, nearly a hundred years ago, worked out the principles of design and methods of construction for suspension bridges which have been followed in every noteworthy suspension bridge since that time. The traditions of sound engineering and uniformly excellent product have been passed down to the grandsons of the founder, now active in the Roebling company. It results that the present organization is not only the inheritor of a sound tradition, but represents a continuity of effort, which, as remarked at the outset, appears to be the essence of good wire making practice.

During this time improvement in cold drawn steel bridge wire has been continuous; that is certain from the following table showing how the specified properties are being increased, and how the designing engineers are loading it to higher unit stresses:

Suspension Bridge	Date	Span, Ft.	Average Ultimate Specified Strength, Lb. per Sq. In.
Brooklyn	1880	1,595	160,000
Williamsburg (N. Y.)	1900	1,600	200,000
Manhattan	1906	1,470	210,000
Bear Mountain	1923	1,632	215,000
Philadelphia-Camden	1923	1,750	215,000
Hudson River	1927	3,500	225,000

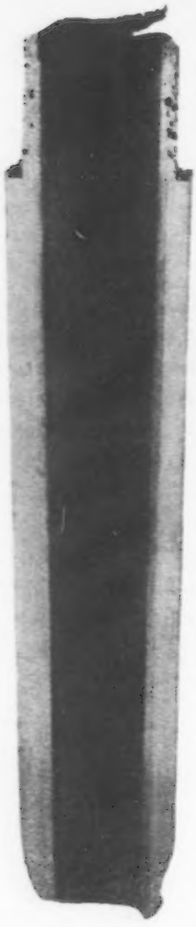
Bridges prior to the Brooklyn Bridge were made with cold drawn wrought iron, having a strength of approximately 90,000 lb. per sq. in. The longest was at Cincinnati, with span of 1057 ft.

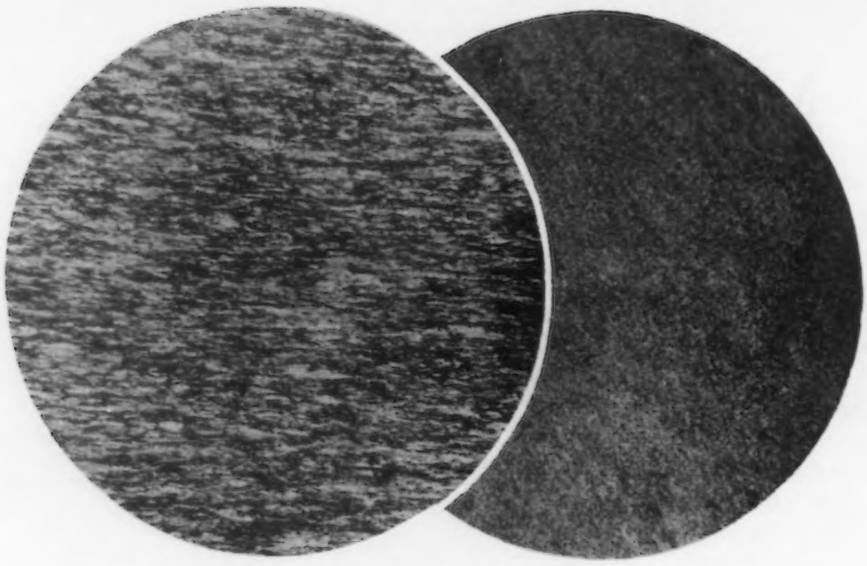
Manufacture of Acid Steel

Returning now to the production of such bridge wire as will go into the Hudson River bridge, "it all goes back to the ingot." Engineers for the Roebling company have insisted that the best steel is none too good for the best bridge wire. Crucible quality is what is desired, without the difficulties which 150-lb. heats would put in the way of uniformity, such as the impossibility of duplicating chemical analyses. It is also desirable to minimize the number of joints in the completed cable, and hence draw as long a wire as possible. (Present limits are about 400-lb. coils.) Acid open-hearth practice is the only commercial process which can produce the high-grade material in the quantities required (28,500 tons for the Hudson River bridge) without unduly increasing the cost.

This is not the place to argue acid vs. basic process, but the experience of the Roebling organization is instructive. There are 12 steel making furnaces under one roof at Roebling. Eight of them have 40 tons capacity and acid linings; four of them are 45-ton basic units. The operators believe they are able to make as clean and good acid or basic steel as is now coming out of open-hearth furnaces. Yet the result is by no means identical. Acid steel appears to be more uniform, heat after heat—

*In the Hudson River bridge the working stress under the worst possible conditions of loading is about 82,000 lb. per sq. in.





A LONGITUDINAL and a Cross Sectional View of Cold Drawn Bridge Wire (at 100 Magnifications) Show That the Equi-Axed Crystals in the Patented Rod Have Been Elongated into Fibrous Threads

—

At Left Is a View of a Split Ingot of Acid Steel; Pipe Is Localized in the Sink Head

now and then a basic heat of correct composition and cleanliness will fail to develop the required physical properties, for some obscure reason. Acid steel also has a higher elastic limit for the same carbon content than basic steel (probably because the acid steel normally contains silicon), and can be successfully put through a drawing program which would be likely to cause many breaks in an equivalent basic steel.

It is generally admitted that the superior excellence of acid steel is due to its lower content of solid non-metallic inclusions, each one a possible focus of a fatigue failure. Why acid steel is cleaner is plain from a glance at the raw material yards. A premium must be paid for selected scrap for either process. Automobile scrap is rigidly excluded from all Roebling furnaces, to avoid contamination of nickel or chromium alloy or lead, copper or other metals from bearings. But even selected basic scrap looks like junk-yard cleanings when compared with the clean plate shearings, and own billet croppings which are charged into the acid furnace. The other part of the charge is pig iron, relatively high in manganese. All of it must analyze well below 0.04 per cent in sulphur or phosphorus.

Present ingot practice represents the development of twenty years. Ingots are 14 in. square, with well rounded corners, cast big end up with refractory tops. This size is not so big as to give trouble from segregation. Thickness of mold walls is proportioned so the ingot solidifies from the bottom up, and contracts free from the mold without surface cracks from "pulling." Free contraction is also aided by a very thin mold wash.

Molds are of Gathmann type; the bottom is closed with a fire brick button and the top is surmounted with a thin-walled rectangular clay top about 11 in. high. Molds are set on stools in a pit; just before filling any loose solid particles are removed with a vacuum cleaner. Teeming is done through a small nozzle; the metal is so quiet that virtually no sparks appear on the edges of the stream. Cross sectioned ingots show the pipe to be close to the top, mostly within the sink head.

With this small stream it requires about 60 min. to cast a 40-ton heat into 30 ingots. Stripping begins about an hour later, and takes about the same length of time; thus all ingots have cooled in the mold about two hours, and are at a dull red heat on the outside. They are laid side by side on a transfer car, one layer deep, and cool slowly in air (under roof) until needed at the reheating furnaces. For some years all ingots were allowed to go stone cold before being reheated, but this is no longer insisted upon.

Blooming and Billet Mills

Reheating is done in oil fired, pyrometrically controlled, continuous furnaces, designed by Roebling engineers, through which the ingots are pushed sideways on water-cooled pipes. Reheating is done very gradually. Seven furnaces are provided to heat 30 tons of metal per hour; by drawing from the furnaces in rotation, each ingot is given about 10 hr. to get up to heat and to soak. Here again, continuity and uniformity of treatment is the prime consideration.

On the approach table the ingot passes between two batteries of steam jets, wherewith scale is cleaned from top and bottom. (The first pass shells the scale from the sides.) The blooming mill is 3-high with tilting tables. Fifteen passes are required to reduce the 14-in. ingot to a 4 x 4-in. bloom; this gradual working is necessary on account of the hard variety of steel and to avoid internal or external ruptures.

Immediately beyond the delivery table is a shear, where a 14-per cent top discard and a 2-per cent bottom discard is eliminated, and the long bloom passes immediately to a 4-stand Morgan continuous mill, from which it emerges as a 2 x 2-in. billet. A 14-per cent discard may seem large for a well-designed sinkhead ingot. In fact, 12 per cent would represent an average value if the bloom were cut back by steps to the bottom of the pipe. But the extra 2 per cent is given to make sure of getting to sound metal; if pipe shows on this cut, the bloom is scrapped.

Between the second and third stands of the continuous billet mill is a surfacing device. As soon as the billet is gripped by the third stand of rolls, four knives press against the sides of the passing metal, shaving off the surface layers about 0.02 in. deep. The finished 2 x 2-in. billet is automatically cut into pieces 30 ft. long by a flying shear, and the billets run out side by side, close nested on a cooling table, under cover. Original ingot

temperature and the speed of operations is high enough so the billet reaches the cooling bed at a full red heat, 200 to 250 deg. above the critical temperature.

By the exercise of usual precautions, plus the unusual practice of slow preheating, descaling the ingot, blooming by easy reductions, and shaving the hot billet, a material of excellent surface characteristics is produced, requiring no chipping or grinding. It is a rule in the plant that if any ingot or bloom has deep surface defects it is not good enough for wire.

It is requisite that each heat he kept segregated until the bridge wire is reeled for delivery to the customer; to identify the billets they are weighed out in 5-ton lots, a pair of chains slung around the bundle in the scale cradle, and carried to the covered billet yard adjacent. The chain slings are tagged and left around the loose bundle; they thus provide ready means of lifting, and at all times establish the identity of their contents. Inspectors for important bridge work are especially insistent on this point.

Manufacture of Rods

Billets are pushed sideways through a continuous heating furnace, gas fired and pyrometrically controlled. Its capacity and length is great enough so the steel is given ample time to reach rolling temperature. Set close to the exit door of the furnace is the first stand of a continuous rod mill, capable of rolling two billets simultaneously.

This rod mill represents the latest design of the Morgan Construction Co. It is fully automatic and carries the billet through a closely spaced series of eight rolls; the rod then passes a flying shear to crop the leading end, and then into another set of four rolls, then a double repeater, a set of two rolls, a double repeater, and finally a double set of four finishing rolls, each set discharging into a pair of reels.

All this equipment is placed so close together and is run at such speed that the leading end of the rod is being coiled before the tail end of the billet is out of the furnace. Since any portion of the billet does not emerge from the heating furnace until it is about to enter the first roughing roll, each portion of the rod reaches the finishing pass at the same temperature, well above the critical. Pyrometric control at the heating furnace, and continuous operation of the stands insures that this finish temperature is nearly the same for one reel after another. Further cooling is controlled by discharging into a pan conveyor leading through a tunnel made of water cooled iron jackets.

Now begins the first of a series of tests to determine quality. Short lengths are clipped from the end of each reeled rod, inspected for size and pulled in tension. It must be within a size tolerance of 0.005 in.; the physical limits are

Ultimate strength, between 140,000 and 160,000 lb. per sq. in.

Elongation in 10 in. between 10 and 15 per cent.

Preparation for Wire Drawing

Before this rod is drawn it must be heat treated and the mill scale removed. Heat treatment is known as patenting.

Aside from reel stands and their driving mechanism at either end, a patenting furnace is a long low-arched furnace through which are slowly drawn from 10 to 40 rods or wire (depending on their cross sectional area), separated sufficiently so the furnace gases can play freely about their outer surface. Through each furnace the rods are drawn at a very deliberate pace depending upon their composition and diameter. Temperature reaches the critical fairly close to the entering end; it then increases very gradually toward the other. Reducing atmosphere is maintained to prevent scaling during the long time at heat. This method of heating and soaking produces fairly large equi-axed austenitic grains, with a high degree of uniformity as to grain size and as to distribution of carbon atoms through the solid solution.

It has been found that the best performance in the cold drawing department is given by metal which has no excess ferrite or cementite in its microstructure. Hence the specification is carbon 0.85 per cent maximum. (Although the iron-carbon diagram shows the eutectoid to be at 0.90, all steel wire has some manganese and silicon in it, and both tend to lower the carbon content of pearlite.) The final temperature of the patenting furnace is adjusted slightly, heat to heat, according to the reported chemical analysis, so the physical properties and the microstructure after treatment may be uniformly correct.

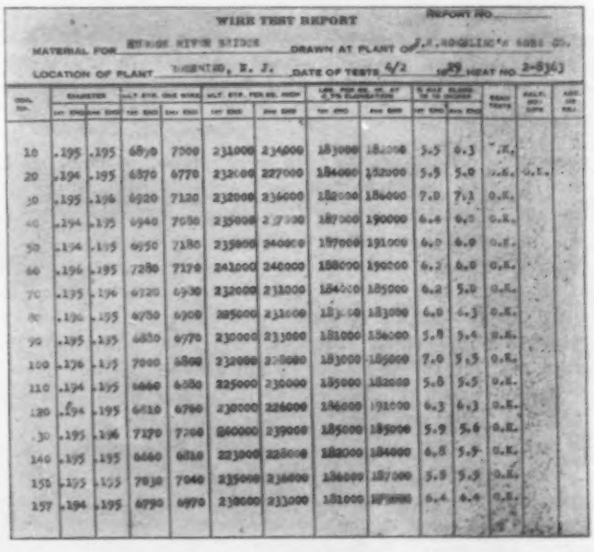
Exit from the furnace is through a heap of fine car-

JOHN A. ROEBLING'S SONS CO.
WIRE TEST REPORT

HUDSON RIVER BRIDGE

DATE OF TESTS 4/1/29

SHEET NO. 1
REPORT NO. 429
HEAT NO. 2-8363
NO. COILS ACC.



WIRE TEST REPORT

REPORT NO.

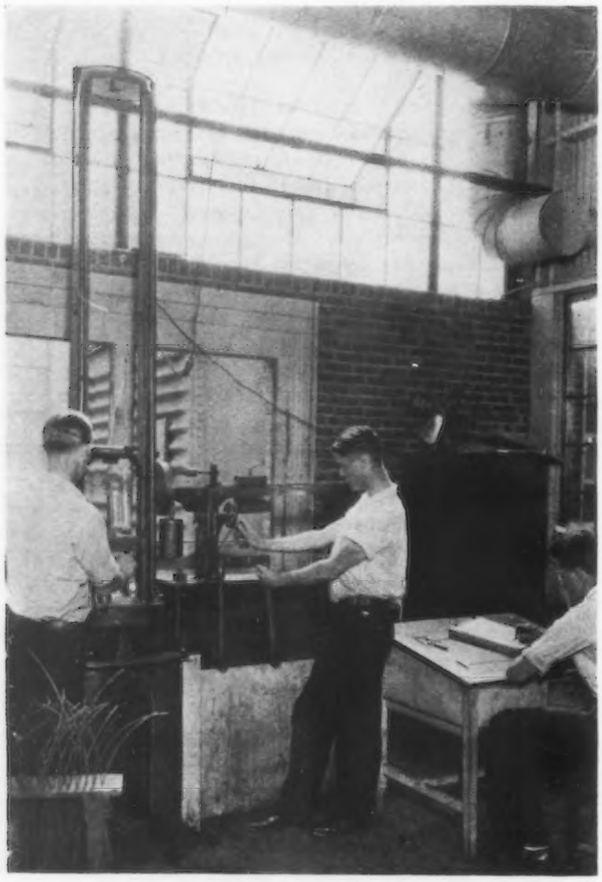
MATERIAL FOR HUDSON RIVER BRIDGE DRAWN AT PLANT OF J. A. ROEBLING'S SONS CO.

LOCATION OF PLANT TRENTON, N. J. DATE OF TESTS 4/2 1929 HEAT NO 2-8363

COIL NO.	DIAMETER		ULT. STR. ONE WIRE		ULT. STR. PER SQ. INCH		LBS. PER SQ. IN. AT 1% ELONGATION		% ELONG. IN 10 INCHES		REMARKS	ADD'L. DATA	ADD'L. DATA
	1ST READING	2ND	1ST TEST	2ND	1ST TEST	2ND	1ST TEST	2ND	1ST TEST	2ND			
10	.195	.195	6870	7000	231000	234000	183000	184000	5.5	6.3			
20	.194	.195	6870	6770	232000	227000	184000	182000	5.9	5.0			
30	.195	.196	6920	7120	232000	236000	182000	186000	7.0	7.3			
40	.194	.195	6940	7050	235000	237000	187000	190000	6.4	6.0			
50	.194	.195	6950	7180	235000	240000	187000	191000	6.0	6.9			
60	.196	.195	7280	7170	241000	240000	188000	190000	6.2	6.9			
70	.195	.196	6920	6930	232000	231000	184000	185000	6.2	5.9			
80	.196	.195	6950	6900	235000	231000	183000	183000	6.0	6.3			
90	.195	.195	6880	6970	230000	233000	181000	186000	5.8	5.4			
100	.196	.195	7000	6880	232000	230000	183000	185000	7.0	5.3			
110	.194	.195	6660	6880	225000	230000	185000	182000	5.8	5.5			
120	.194	.195	6810	6760	230000	226000	186000	181000	6.3	6.3			
130	.195	.196	7170	7200	240000	239000	185000	185000	5.9	5.6			
140	.195	.195	6660	6810	223000	228000	182000	184000	6.8	5.9			
150	.195	.195	7030	7040	235000	236000	186000	187000	5.9	5.9			
157	.194	.195	6790	6970	230000	233000	181000	185000	6.4	6.4			

ROUTINE Test Report at Left Shows Strength and Elongation at Rupture of Both Ends of 44 Coils of Heat No. 2-8363. Every tenth coil is missing on this report, but shown on the one just above, because elastic limit and bend test must also be determined for these specimens

bonaceous matter directly into a lead bath. Its temperature is such that it quenches the wire at the correct rate to transform the entire structure into sorbite. Few traces of the previous austenitic crystal boundaries can be seen under the microscope, but it is believed that this amorphous or sub-crystalline boundary material retains its identity after quenching. As shown, a cold drawn wire made from patented rod has a quasi-fibrous microstructure, and these "fibers" are believed to represent the drawn-out remnants of the austenitic crystals that existed before



Inspector's Laboratory for Making Tension Tests on Completed Bridge Wire

quenching. A structure such as produced in cold drawn wire notably improves the resistance to fatigue—a surface crack started from any cause does not propagate itself as it would in uniformly crystalline material, but on passing through one of the "fibers" it reaches material of another nature (amorphous boundary), and then a second fiber having the component crystalline particles arranged along entirely different planes, through which the crack must start itself all over again.

After patenting, each coil is again tested on each end. It is very stiff and hard. To straighten the rod it must be held in a vise and given a stout double-handed pull.

Scale is next removed by immersing the coils in dilute hydrochloric acid. This is said to be better than sulphuric, primarily because it induces less embrittlement from absorbed hydrogen. Pickling is the first searching, 100-per cent test which bridge wire receives. Should a defect be concealed just below the surface of the rod, pickling will open it up; and, as noted above, since high-carbon steel in the heat treated condition is quite susceptible to surface imperfections and hydrogen embrittlement, the rod snaps apart. Such a bundle is immediately discarded; numerous investigations show such troubles to originate in minor defects, a scratch or dent in the surface, a non-metallic inclusion or a minor fracture from rolling, or a defect coming through from the ingot.

After rinsing and vigorous use of fresh water from a hose, the coils are given a "water coat"* and then are dipped in lime water to neutralize remaining traces of acid, and baked for several hours to remove atomic hydrogen dissolved in the metal during pickling. The rod is at last ready for the draw bench.

Wire Drawing Operation

It is unnecessary to describe the operation of wire drawing, since this is well known, and bridge wire is handled in the ordinary way. Heat treated alloy steel dies are needed for the relatively large and hard rods to be handled. The number of draws and the proportionate reduction in each pass, is, as with all cold drawn wire, adjusted to the ductility of the original material and the physical properties desired at the end.

Wire drawing does not compact the metal, as might be thought. The specific gravity of cold drawn wire actually is lighter than that of patented rod. The disorganization of crystalline structure caused by crowding and pulling the cold metal through a die evidently increases the atomic spacings, either systematically or at isolated parts. Systematic stretching of the crystalline lattice along the length of the wire has been inferred from certain X-ray studies. Increased solubility in pickling solutions of well made wire, and easily detectable ruptures in over-drawn wire, are facts indicating that a multitude of sub-microscopic cavities are also formed during cold-drawing.

Whatever the correct theoretical explanation may be, it is well known that cold drawing largely increases the elastic limit of the unstressed material, and also improves the ultimate strength. The operation must be conducted by such degrees, therefore, that the strengthening is approximately uniform from surface to axis of the wire, and at no step must any portion of the metal be punished too severely.

Each one of these passes through a die constitutes another 100-per cent non-destructive test of the uniformity and quality of the steel, unapproachable by any known program of physical testing. No hidden flaw can escape this searching trial. This is probably the only material whose method of manufacture involves a like series of continuous proof-tests.

Wire for the main cable of the Hudson River bridge is drawn to 0.192 in. diameter. Coming from the last die, it has a shiny, black surface like a planished sheet. It is known as "bright" wire. There is about 4000 ft. in a 380-lb. coil; caliper measurements on about 70,000 coils already made for the Hudson River bridge show the diameter at rear end to be 0.00074 in. larger than the front end,† as much caused by variations in the zinc coating as the wear in the die. As in the previous step, each end of each reel is clipped and given a tension test.

Physical properties of the bright wire are within the following ranges:

Ultimate strength.....	240,000 to 250,000 lb. per sq. in.
Elastic limit.....	190,000 to 210,000 lb. per sq. in.
Elongation in 10 in.	2 to 3 per cent

Galvanizing and Inspection

Finally, the wire is unreeled and run through galvanizing equipment for coating with zinc. A layer about 0.003 in. thick, sufficient to stand five dips in the standard Preece test, is obtained. Cleaning before galvanizing roughens the surface slightly, and the heat of the galvanizing bath causes a certain amount of strain relief in the

*A "water coat" is prepared by allowing a thin coat of rust (essentially hydrated iron oxide) to form in a warm moist atmosphere. Such hydroxide is an essential lubricant in wire drawing.

†Average figures of all tests to date are 0.19590 in. and 0.19516 in. respectively.

fibrous structure. The net result can be seen by comparing the following figures with those just quoted:

Ultimate strength (average of 138,000 tests)	232,070 lb. per sq. in.*
Elastic limit (average of 13,800 tests)	180,665 lb. per sq. in.
Elongation in 10 in.	5.5 to 7.5 per cent
Modulus of elasticity (300-in. gage length)	28,000,000

The specified figures required for acceptance are:

Minimum ultimate strength	220,000 lb. per sq. in.
Average ultimate strength	225,000 lb. per sq. in.
Elastic limit (load at 0.7 per cent elongation)	154,000 lb. per sq. in.
Minimum elongation at rupture (10-in. gage length)	4 per cent

It has been stated in the literature that cold drawn wire has no real elastic limit, because the stress-strain curve shows a slight bend from the very beginning. Tests made at the Roebling laboratory, with calibrated equipment and special precautions to minimize lost motion and slippage, lead the engineers to believe that the load is proportional to the stretch of cold drawn steel bridge wire (within the limit of accuracy of the equipment) up to 180,000 lb. per sq. in. Deviation from this straight line relationship is very gradual, so it is difficult to detect the exact limit of proportionality; hence the conventional acceptance of the 0.7 per cent elongation as representing that point for specification purposes.

Although the elongation at rupture in tension of bright wire is 2 to 3 per cent on 10-in. gage length, this wire, almost file hard, can be coiled about itself in a tight coil like a Western Union cable splice. This means that the outer fiber has been stretched 50 per cent without fracture. After galvanizing, it can always coil about 1.5 diameters without fracture—frequently as close as one diameter. The discrepancy between elongation and coiling ability is partly explainable by the fact that the general elongation in 10 in. does not measure the ductility before rupture; the wire necks down considerably at the fracture (reduction in area ranges from 20 to 30 per cent) and the true elongation in a short distance is probably in the neighborhood of 50 per cent.

Tension tests for acceptance are made by inspectors for the purchaser with the equipment shown. Both ends of each coil are clipped and broken in tension. Every tenth coil has its elastic limit determined. Samples at random are twisted in a "pig tail," without visible fracture of the zinc coating. Dip tests for thickness of coating are also regularly given.

*It should be pointed out that this is figured on the diameter of the galvanized wire; if the thickness of the zinc coating were allowed for, this ultimate strength would approach that of the bright wire.

Engineering Foundation, the joint research instrumentality of the civil, mining, mechanical and electrical engineering societies, has issued its fourteenth annual report. Investigations it is aiding in various ways include a compilation of available literature on the alloys of iron, laboratory researches on the iron-manganese and the iron-silicon alloys, on blast furnace slags, on wire rope, on the strength of gear teeth, on friction in journal bearings and on cutting fluids.

Heavy Bending Dies Fabricated of Welded Plates

A CONSIDERABLE portion of the work in a good-sized boiler shop or plate fabricator consists in forming flat plates to various curves. Much of such work can be done in bending rolls, but flanging, dishing, or bending conical or warped surfaces is more handily done under a hydraulic press.

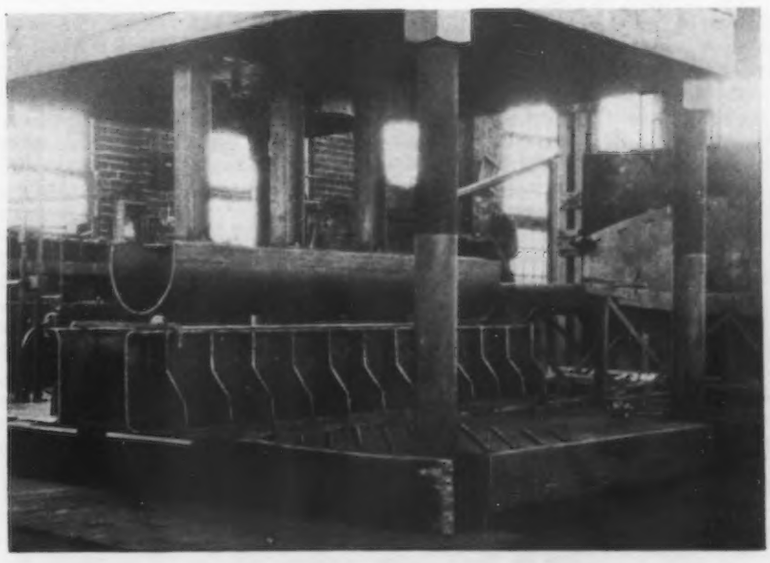
Dies for such purposes have ordinarily been made of cast metal. Frequently the expense of making such dies, both in the matter of time consumed as well as the manufacturing cost, has been considerable, inasmuch as only one die of a kind is generally required, and the pattern cost must be charged off on a single piece.

Having had extensive experience in the use of the electric welding process in the manufacture of the Ross steel heating boilers, the Frost Mfg. Co., Galesburg, Ill., decided that dies for forming crown, sides and mudring of such boilers could be more economically built by arc welding.

The half-tone shows a pair of forming dies built in this manner and in place on the platens of a 500-ton Woods hydraulic press. The upper die is built of three pieces of heavy steel plate shaped and welded to form a semi-circular trough, braced by steel plates cut to fit inside the trough and welded in place. This semi-cylinder is suspended from the head of the press by four H-beams, which act as columns in compression when boiler or other steel plate is being shaped by the dies.

The lower dies mounted on the platform are also built up of steel plate formed in the shape of a channel with unequal flanges. These pressed channels are reinforced by plate stiffeners between flanges, butted against the webs and fillet welded on both sides. Two of these are made, one right hand, the other left hand, and bolted securely down to the press bed. Hook bars across the open ends take care of some of the outthrust imposed when a plate is being formed, yet are easily removable so the completed work can be slipped endwise out of the press between the lower dies.

This particular set shapes the crown sheet. The largest plate which has been bent by it is 110 x 160 x 13/32 in. and weighs 2230 lb. The forming is done cold. Formerly the crown and side sheets were made up of three pieces of plate welded together.



Dies of Arc Welded Steel Construction Installed in a 500-Ton Hydraulic Press

Engineers Discuss Material Handling

Detroit Meeting Features Management Also—Automotive Methods as Applied to Other Industries Brought Out in Detail

A PROGRAM which many present thought was too full was carried out last week at the Detroit meeting of the Materials Handling Division and Management Division of the American Society of Mechanical Engineers, with the American Management Association cooperating. The meeting was held at the Book-Cadillac Hotel on Wednesday, Thursday and Friday, with technical sessions both afternoon and evening and with the entire morning of each day devoted to visits to manufacturing plants. The banquet was held on Thursday evening, with Alex. Dow, past-president of the society and president of the Detroit-Edison Co., as chairman. The toastmaster, Col. James L. Walsh, vice-president of the Guardian-Detroit Bank, is chairman of the National Defense Division of the society. The principal speaker was C. F. Hirshfield, head of the research department of the Detroit-Edison Co.

Because of the large amount of ground to be covered, the morning inspection trips left the hotel at 8 o'clock each day. The plants visited included the Oakland Motor Co., Wilson Foundry & Machine Co. and General Motors Truck Co. at Pontiac, Mich., Packard Motor Co., Dodge Brothers Motor Co., Detroit Vapor Stove Co., Hudson Motor Car Co., Plymouth plant of the Chrysler Corporation and Chevrolet forge plant in Detroit, the River Rouge plant of the Ford Motor Co., the Ford Airport at Dearborn and the Aircraft Development Corporation at Grosse Isle. As many of these visits were simultaneous, the 400 or more men registered were split up into parties, of which the largest—at the River Rouge plant—numbered above 200.

After an introductory address at the first technical session, delivered by James Lynah, director of staff of the works managers' committee, General Motors Corporation, there was a succession of papers, covering mostly automotive usage along various lines of materials handling and production control. At the last session, however, there were four papers detailing the application of automotive methods of operation to other industries.

These included the glass industry, which was discussed by C. W. Avery,* president Murray Body Corporation, Detroit, and formerly general superintendent of the Ford Motor Co.; electrical industry, by E. L. Spray, chief engineer Westinghouse Electric & Mfg. Co. at the Mansfield, Ohio, works; stove industry, by Alvin G. Sherman, general manager of the Detroit Vapor Stove Co., and the washing machine industry, by Henry M. Lane, Detroit, consulting engineer, with particular reference to the Maytag Mfg. Co. (whose plant and operations were described in some detail in six articles in THE IRON AGE of June 2 to July 7, inclusive, 1927).

Management as applied to materials handling, with regard to the effect on the operative, wage incentives, conveyor pacing of work and inventory control, formed the topic of the first technical session. Two papers were read at this session: one on forge shops, by Hugh Dean, manager of the Chevrolet forge plant in Detroit, and the other on the foundry, by L. W. Pardee, superintendent of the Wilson foundry at Pontiac. Brief abstracts of these papers follow. Abstracts of other papers dealing with other topics are handled separately in this and succeeding issues of THE IRON AGE.

*Mr. Avery was referred to, by the chairman at this meeting, as the "father of the practice of manufacturing on conveyors."

Management Applied to Materials and Production Control

DESPITE the thousands of parts or units going into an automobile, 35 or 40 parts make up 85 per cent of the material cost of the inventory, according to Mr. Lynah. Each should be studied separately in connection with its relation to conveyor handling from incoming cars clear through to assembly lines. The turnover rate is the final answer as to efficiency of control and handling in the plants, and a basis for wage-incentives, etc. Capital released from inventory items is available for further expansion, or other uses.

In the past four or five years the production of cars of the General Motors Corporation has increased by 150 per cent. But, in spite of this great expansion, the inventory has increased only $5,000,000, because the rate of turnover has gone up from 8 times in 1925 to 20 times last year.

Proper wage incentive methods have borne no small part in that result. A standard time is set for a job and a scale of efficiencies established. For each efficiency is a corresponding bonus. This is established for the group, as a group bonus is regarded better than group piece work, because it becomes possible to vary the individual worker's remuneration without interfering with any of the others. The bonus percentage is the same for all in the group, but each man has his own base rate on which that bonus is figured.

Materials Handling in Forge Shop

DURING 1928 the Chevrolet forge shop received and used 202,000 tons of steel, consisting of 90 different sizes and 17 specifications, from which were forged 101 parts, according to Hugh Dean, manager of the plant. "All steels are ordered in multiple lengths with no allowances made for re-shearing. Each specification has its own color scheme and the mills must paint each and every bar. In this way the danger of mixing steels is reduced to the zero point, as every man connected with handling the steel while unloading and shearing is given a thorough schooling in the meaning of the different color schemes.

"We also insist that each heat be shipped in its entirety in one car, that no car contains two different specifications of the same size and that shorts above 5 per cent be not allowed.

"Our steel yard contains 194 bins separated by 8-in. H-beams, each bin having a capacity of 100 tons. We have four 10-ton magnet cranes used exclusively in the unloading of steel cars, the loading of flash into cars and the moving of steel from bins to the three shear sheds. These sheds house seven Pels billet shears and four alligator shears of different

capacities, to accommodate the various sizes of steels cut. All steels are cut cold.

Methods of Moving Materials

"From the shear, material is moved to the hammers in flat racks by means of electric trucks. At each hammer are an end dump rack and either a box rack or a flat rack. Into the dump rack, one member of the crew places the flash, eliminating the use of non-productive labor for this operation. Flash racks are moved, after filling, by trucks.

"Into the box or flat rack, whenever possible, the same procedure is followed for the forging after it has been made. In most cases, however, the forging is allowed to fall in front of the hammer, where it is inspected and counted by counter inspectors. These men perform three operations; counting, inspecting and racking, saving the cost of laborers' and inspectors' wages.

"From the hammers the forgings are moved to secondary operations, such as trimming, grinding, heat treating, rattling or pickling, in racks by electric trucks. One exception is the cold trimming operation. Here press hands place all flashings in upper tier of a two-high conveyor and the trimmed forgings in lower tier. Conveyor then empties forgings at one end into an automatic tumbling barrel, where they are rattled and emptied into a conveyor sorting table. At the other end flashings are emptied into a dump rack which in turn is emptied every hour. Handling of both raw and finished material has been entirely in racks by electric trucks.

Automatic Handling for Crankshaft Forging

"It has been the consensus of opinion of the forging industry in general that conveyors, or the automatic handling of forgings, were never intended for forge shops. This theory we have disproved and we are preparing a program which will entail the entire revamping of present shop.

"Early last year we started erection of a plant to be devoted exclusively to manufacturing crankshafts. We made up our minds to have it as nearly automatic as humanly possible.

"We designed automatic furnaces for heating the raw stock, monorails for handling the crankshaft to the press, where it is trimmed, to the upsetter where it is flanged, to the restrike hammer, where it is restruck in two positions, and finally monorailed to an overhead conveyor to the heat treating. The crankshafts are then placed on carriers while still hot and automatically shoved through the quench heat on a 2-min. 20-sec. cycle.

"At the discharge end of the quench furnace they are picked off by fingers that are so perfect in their operation that they are nearly human. The crankshafts are then quenched and placed on carriers and shoved through the draw heat. From here they are carried by gravity conveyors to straightening presses, straightened and placed on pickling baskets, pickled by automatic pickling machines and the same baskets taken to the grinders.

"Here the crankshafts are ground for Brinell test and placed on a continuous slat conveyor, where they are brinelled, indexed, inspected and conveyed into cars. Our method of handling flash and tong ends is also automatic. Flashings and ends are placed on a chain conveyor by a member of hammer crew and conveyed to cars."

[This plant was one of those inspected.]

Material Handling in the Foundry

DEVOTED to the production of automotive parts, the Wilson Foundry & Machine Co., Pontiac, Mich., turns out castings for Willys-Knight and Whippet Motors. The daily capacity of 450 to 500 tons is reached in a plant built for half that amount. L. W. Pardee, plant engineer, told how this was accomplished. [This formed the subject of a series of articles in THE IRON AGE in 1923—March 15, April 12, May 31 and July 26—and an article Oct. 2, 1924, on the conveyor system installed.]

"As production gradually increased, the foundry was confronted with the problem of increasing the tonnage capacity without much change in the floor space. The mechanical handling equipment selected was influenced, not only by what we wished to accomplish, but also by the fact that it had to go into buildings already in place. Consequently the equipment differs from what is ordinarily selected where the buildings and handling equipment are designed at the same time."

After describing in some detail the equipment which was covered by THE IRON AGE articles above mentioned, the author closed with this statement:

"While these installations of mechanical handling equipment have helped to solve some of the problems which have confronted the plant in securing an increased production, other problems still remain, such as the handling of cores and the molding of small castings. There is no doubt that the use of mechanical means for handling these will be adopted from time to time."

Applying Automotive Methods to Other Industries

AFTER detailing the evolution of the manufacturing methods in the automotive industry, from the time a car was built at one spot, and a few dozen other cars simultaneously at other spots, Mr. Avery told, with the aid of moving picture films, of the application of the same methods of approach to the making of plate glass. He spoke feelingly of the many obstacles which had to be overcome, some of them chemical, others mechanical and still others inertia—"It can't be done," etc. He described first the conventional manufacturing methods, as a background for the new operations.

"About 1918, at the Ford Motor Co., we conceived the idea of manufacturing plate glass by continuous methods similar to the methods then used in the automobile industry. Our plan, in general, consisted in melting the glass in a continuous tank furnace, with the batch entering at one end and the molten glass running out of a spout directing to the rolling machine at the other end, then, in the form of a ribbon, passing through the various temperature zones of the annealing furnace, commonly called a lehr.

"It was then to be cut into convenient lengths, mounted on rectangular tables and passed continuously under a series of grinding, smoothing and polishing wheels. When the first side was finished the glass would then be reversed on the same tables and returned, under the second series of wheels, to the starting point, where the finished glass would be removed and the tables be ready to make another round."

How many snags were overcome was told here in some detail.

"After four or five years of intensive study and hard work, we were able to produce a good quality of plate glass by the continuous process at approximately half the cost of production by the old methods. This is simply an illustration of the application of continuous methods of manufacture to an industry other than the automobile industry. The necessary requirements for this application are—

"Sufficient volume of production;

"A serious, scientific study of the problem in hand."

Application to Electrical Manufacturing

WHEN the Westinghouse Electric & Mfg. Co. "began to install conveyors and learn more about their application, we soon found that, while they were only a small part of the whole scheme, they forced the adoption of better production control methods, better planning, better and more positive processes, better tooling, etc., according to E. L. Spray's paper.

"Therefore, if we accept the term 'conveyorized production methods' in

its larger sense, including the improvements which it has brought about, we can use that term to express the contribution of the automobile industry, not only to the electrical industry, but to all American industries.

"The electrical industry is somewhat like the automobile industry in that it is a relatively young industry. It is not old enough to have acquired a mass of tradition, as have most of the other industries. This is, no doubt, due to its rapid development from an engineering standpoint. This lack of tradition has been a great help in introducing new production methods.

Where the Volume of Production Lies

"It is in the field of the manufacture of devices for the utilization of electric current that the greatest volume is found, and as would be natural, the greatest use of conveyorized methods obtain. Our industries are producing electric light bulbs, motors, fans, radios, irons, toasters, waffle irons, percolators, meters, ranges, safety switches and many other devices, on a mass production basis. At the Mansfield, Ohio, works, we manufacture electric heating appliances, ranges, safety switches and industrial ovens and furnaces.

"A few years ago our business had outgrown our facilities and it was necessary to expand. Our management felt that the time was ripe to consider mass production methods. A few of our experiences are indicative of what may be expected in applying mass production methods to a varied line of manufacture with frequently changing models.

Concentrating on "Volume" Items

"One of the first objections which we met, and which has been advanced by a number of other plant executives, was that we had too large a variety of models or styles. We found that we had approximately 4500 styles of completed apparatus. But we also found that a surprisingly large amount of our total sales were on a relatively small number of styles. We, therefore, decided to set up conveyors on our volume items and to continue our old methods on the less active lines, except where common parts could be processed together.

"This led us to divide our plant into a number of smaller plants, so to speak, and to look on each major line of apparatus as a separate business. We decided to set up the range, sad iron, switch and appliance divisions on a straight-line basis, pretty much independent of each other."

Selection of conveyor equipment and its application were described by the speaker, who gave examples of the benefits which had accrued from the system evolved.

"Due partly to conveyors and partly to improved process control, we have reduced spoilage on one of our finishing processes from an average of 12 per cent to less than ½ per cent. Even if no direct labor savings are made, the reduction in rejects alone often returns the whole investment in a very short time.

"To sum up briefly, the results of conveyorizing have been:

"Lower labor costs,
"Lower inventories,
"Lower rejects,
"Less floor space,
"Better processes,
"Better planning,
"Better tooling,
"Last, but not least, a more uniform product."

Accommodating the Stove Industry

"SIXTEEN years ago we installed in the factory a 65-ft. track in our assembly department," said Alvin G. Sherman. "Even after this installation, however, the stove bodies were partially assembled on benches and the crating done after the stoves were taken off the track.

"One rather humorous situation which developed shortly after the installation of the system concerns the method adopted to meet an emergency brought about by a split gear on the drive-shaft. The stock chaser volunteered to supply the motive power himself, until new gears could be installed. With the aid of a large wrench the track was kept moving for a day or so, albeit in an intermittent fashion. And thus was marked the beginning of the new system of stove production.

"Our present factory is completely equipped with a track and conveyor system. The assembly track for the White Star gas range has a total length of 1000 ft., extending in two parallel sections about 6 ft. apart.

Assembling on Conveyors

"At one end of this track the first operations on the skeleton frames are performed, and then each assembly operation follows successively. By the time any one particular stove reaches the turn at the other end of the building, it is completely assembled with the exception of the burners, oven linings, grates and heat control. These are placed in the stove on the second track. The stoves are tested midway along this track, and by the time the stove has reached a point opposite the first assembly operation, it is crated and stencilled, and is ready for direct loading in cars or on trucks.

"A faster shipping conveyor takes the stoves to the loading point and warehouse. The capacity of the line is approximately 1000 stoves in an 8-hr. working day. The extra long track not only provides ample room for storage of the different parts, but it also makes possible a large production without crowding the men."

Mr. Sherman then told of the methods used in carrying parts through the furnaces and drying rooms.

"After the ware has completed one revolution of the furnace it is removed and placed upon a straightening caterpillar. By the time the ware reaches the end of this conveyor, it can be easily handled with asbestos gloves and placed on the next conveyor, for further treatment. Circling back and forth four times over a space about 40 ft. long, it has cooled sufficiently to permit spraying. A spray booth is located just before the conveyor enters the second drying room. The brushing is done upon the emergence of the parts from this chamber. The process is completed by the application of a second coat of porcelain, a third drying and burning, and the ware then receives its final inspection.

"A belt conveyor takes the finished product to the assembly floor above, and it is then ready for production. In all, less than two hours are required between the time any one piece is dipped, before it is sent upstairs on the belt conveyor, a finely finished product of porcelain ware.

"There are certain stove parts which are not suitable to run through this conveyor system, such as the very small pieces and some of the cast-iron parts. For these we have a straight furnace, electrically equipped.

Unusual Pickling Method Used

"Our pickling system is unlike anything else of its kind in the ceramic industry. Here, too, the conveyor system is used, coordinating perfectly with the rest of the equipment. The metal pieces as they come from the press room are suspended on hooks or in baskets on a series of steel rods about 1½ in. in diameter, and about 7 ft. wide. These bars are fastened to a heavy roller chain which passes over large gears run on a schedule which permits the metal to be thoroughly cleaned and pickled.

"This conveyor runs at a speed of 140 ft. an hour, and has an almost unlimited capacity. The conveyor and five tanks are housed in a glass inclosure which is well-ventilated and so arranged that every part of the machinery is readily accessible in case of a jam. Although the speed of the conveyor is constant at all times, the period of immersion of the sheet metal parts in the various tanks is regulated by the length of the horizontal section of the conveyor immediately above each tank."

Trail of the Automobile in Industry

"PROGRESSIVE assembly of entire machines or groups or parts of machines did not originate with the automobile industry, as the agricultural implement trade had been practising this style of assembly for many years before the first automobiles became a commercial product in the United States. The automobile

(*Concluded on page* 1326)

Consider Numerous Business Problems

Plant Capacity, Trade Practice Conferences, Employee Pensions, Among Topics of National Chamber of Commerce Meeting

WASHINGTON, May 4.—Covering a wide range of subjects, the seventeenth annual meeting of the Chamber of Commerce of the United States, held here April 30-May 3, was devoted to "Growing Responsibilities of Business," dealing with industrial, business, agricultural, financial, legislative, international and other problems and was attended by about 3000 delegates. Expressions of the National Chamber's policies were set forth in a series of resolutions. The board of directors elected officers for the coming year, Julius H. Barnes, New York, being chosen chairman to succeed the late Joseph H. Defrees, while William Butterworth, Moline, Ill., was reelected president.

Views Crystallized in Resolutions

Among the resolutions was one which held that the 12 per cent corporation tax is burdensome on productive enterprise and should be reduced to correspond more nearly with the normal rate on individual incomes. The Bureau of Internal Revenue was commended for its efforts in speeding up tax settlements and it was urged that long delayed cases be rapidly disposed of and that there be prompt final determination of tax liability in the future. Trade associations and chambers of commerce were asked to study state and local taxation problems so as to develop plans to remove excessive burdens from interstate business.

Recommendation was made that the Tariff Commission be strengthened for expeditious determination of questions coming before it with full responsibility under the President. To support American foreign trade further, the Chamber recommended that the Senate ratify the International Convention for the Abolition of Import and Export Prohibitions. Repeal of the national origins provision of the immigration act was urged. Uniformity of aeronautical legislation among the states was declared to be necessary and the establishment of airports essential to the proper expansion of air transportation, and appropriations with this end in view was recommended for States, municipalities and counties. The approaching era of severe international competition was held to make it timely to give recognition to a national program for development of mineral resources, and to this end it was recommended that the Bureau of Mines and the Geological Survey be maintained at highest efficiency, scientific inquiry fostered and mining be encouraged by relief from excessive taxation.

It was declared that the Interstate Commerce Commission should be permitted to continue to regulate rates in accordance with its own expert knowledge and judgment.

Dealing with the credit situation, the Chamber expressed confidence in the Federal Reserve system and its adaptability to new conditions and said that the system is entitled to the utmost cooperation. Basic industries, especially the smaller units of manufacture, distribution and agriculture, it was held, should not be burdened with unusually high interest rates resulting from security excesses.

Plants Usually Well Located

AT the group conference on "Industrial Extension Problems," the view was expressed that industrial plants of the United States generally are economically located to meet present-day competition. A. L. Scott, Lockwood Greene Engineers, Inc., who opened the discussion, declared that the success of the steel, automotive and other great industries proves that they are well located from a point of efficient operation and marketing, and the same was declared to be true of industries in other lines.

Taking up the question of so called excess plant capacity, Mr. Scott said the term was indefinite, but he asserted that developments such as those in communication and transportation affect demand and customs and consequently have an important bearing on capacity. Such developments were said to mean rearrangement of machinery or new machinery to meet changed conditions.

Col. L. S. Horner, president, Niles-Bement-Pond Co., said that the American machine tool industry capacity is about 40 per cent in excess of any possible demand that may be created by the metal-working industry for some time to come, though some machine tool plants are now operating at capacity. He gave credit to President Hoover for having brought about a great change in the attitude of industrial executives, who now disclose trade information much more freely than previously. The change was said to be due in a large degree to the work of Mr. Hoover when he was Secretary of Commerce.

Machinery Obsolescence Supremely Important

The declaration was made by Professor R. H. Lansburgh, of the University of Pennsylvania, that obsolescence of machinery is the most important question industry has to answer today. Rapid changes in processes of manufacture, new products, the effect of new equipment in extending industry, and the replacing of men with machinery in order to increase output, reduce costs and expand markets were discussed at some length as showing the present-day industrial situation. New and improved machinery, he said, is required for quick replacement of machinery that has been in use only a short time so that the question of obsolescence becomes of greatest importance. It was contended that Treasury regulations governing obsolescence for taxation purposes are not sufficiently lenient to meet requirements of modernized industry.

Explaining the fast movement of machinery in replacing man power and developing mass production, Professor Lansburgh said that the steel industry is supposed to have taught the world how to manufacture on a mass basis. He told of a visit he made to the Homestead plant of the Carnegie Steel Co., and said that he agreed with a statement made to him on that occasion that the plant was safe.

"It is safe," said Professor Lansburgh, "because, except for a casual visitor, there is no one around to be hurt."

Opportunities are unlimited, he declared, for industrial expansion of established plants through modernization of equipment and management. Some automobile manufacturers, it was asserted, demand that obsolescence be written off in one year. The petroleum industry, Professor Lansburgh said, has cut down the period from five to two years. He spoke of the modern equipment in use by the metal cutting industry as an example of keeping abreast with the times.

Outstanding examples of modern methods of production were mentioned by W. C. Cochran, of Cincinnati, who cited the continuous process of the American Rolling Mill Co. Allen T. Hill, American Die & Tool Co., Reading, Pa., made the point that some 30 years ago high-speed steel for cutting was brought out and that production has been increased "not by tools but by the brains of the men who designed the tools."

Industry Should Provide Pensions

UNLESS industry attends to the pensioning of its employees, the legislatures will and if the latter is done it will be more expensive and more wasteful than the private undertaking, the Employer-Employee Relations conference was told by Mangus W. Alexander, president, Na-

tional Industrial Conference Board. Mr. Alexander discussed the great expense of the dole system in England and the various taxes that have to be paid by German manufacturers because they have not adopted pension plans.

Homer Ferguson, president, Newport News Shipbuilding & Dry Dock Co., said that industrial concerns which do not have pension plans "have them but don't know it." He declared that old employees in plants where there is no pension plan are taken care of by placing them in less important positions with the result that production is slowed up. It was the view of the conference that the older worker cost is inevitable either through hidden costs or pension costs. It was the general opinion that the tendency is to give intensive study to the financial reorganization of existing pension plans and to the better carrying out of new plans. Colonel Horner presided over the conference.

Trade Practice Conferences Favored

OPPOSING views regarding trade practice conferences of the Federal Trade Commission were expressed by Colonel Nelson B. Gaskill, and Abram F. Myers, former members of the commission, at a round table meeting on that subject. Colonel Gaskill disapproved and Mr. Myers approved of the conferences.

"Under the law," said Colonel Gaskill, "the commission's field is a narrow one. It is too narrow adequately to regulate and prescribe for the needs of industry; and the problem is to find a practicable way by which industry can evolve and work out codes for itself with reasonable freedom from government regulation. The insertion of new material by the commission into the codes, submitted to the commission by industries, for example, introduces an element into the situation that strongly smacks of government control in business. That is not what we want. What we want is as great a degree of individualism in business as is consistent with the public good."

In taking issue with Colonel Gaskill Mr. Myers declared that such alterations as the commission had made in rules submitted by industries had been designed merely to bring the rules clearly within the law so that they would have the support of the courts. The prevailing view of the meeting was strongly in favor of the trade practice conferences.

The interest in this topic was heightened by a discussion at a general session on "Business and Government" when Dr. Julius Klein, Assistant Secretary of Commerce, assailed paternalistic interference with business and said that the Department of Commerce accepted in full the doctrine of private business initiative. Yet, Doctor Klein said, the Government, including the Department of Commerce, is constantly being urged by private citizens to extend its activities into the realm of business. This applied to simplified practice in manufacturing and selling and the Domestic Commerce Division of the Bureau of Foreign and Domestic Commerce.

Asks Government Study of Distribution Costs

The National Wholesale Conference, which met in Washington April 26 and 27 under the auspices of the Chamber of Commerce of the United States, recommended that the Department of Commerce be asked to inaugurate a movement to establish a central control of distribution cost studies, to be organized, directed and supervised by the department. It was also recommended that trade associations organize an inter-association committee on education to promote a better understanding of the functions and inter-relations of the various agencies engaged in distribution. The pressing need for economies in costs of distribution was emphasized in the reports of committee to the conference.

Drexel Institute Has New Engineering Laboratory

Drexel Institute, Philadelphia, formally dedicated its new engineering laboratory, the gift of Cyrus H. K. Curtis, the publisher, on May 2. The building has been called Curtis Hall Engineering Laboratory. It was opened with appropriate ceremonies, followed by a luncheon. Elisha Lee, vice-president of Pennsylvania Railroad, paid tribute to Drexel Institute's plan of coordinating theoretical training in college with practical work in the industries. The new building, which cost $750,000, is part of a $2,000,000 building program which Drexel Institute has carried to completion within the past four years.

Large Companies Installing Heat-Treating Furnaces

Several large steel companies have recently contracted for heat-treating and heating furnaces. The Allegheny Steel Co., Brackenridge, Pa., has placed a contract for a Kathner roller bottom furnace for normalizing full finished automobile body sheets. The furnace will be 155 ft. long, 90 in. wide and is expected to normalize 200 tons of automobile sheets in 24 hr. The American Sheet & Tin Plate Co., at its Mercer works, will also install a Kathner type, oil-fired normalizing furnace of the same dimensions.

A continuous furnace, employing the zone control principle of firing, has been contracted for by the Youngstown Sheet & Tube Co., Youngstown. For delicate heating purposes, such as are required of this furnace, temperatures throughout the length should be under absolute control. This is obtained by independently regulating the various sections of the furnace as to temperature, thus making an extremely flexible furnace as to output without injury of the steel by overheating.

The Granite City Steel Co., Granite City, Ill., is increasing its plate mill capacity by installing a triple-fired continuous furnace; this will also employ the zone control principle. There are three sets of burners, two of which do the main heating work, the third maintaining a constant temperature in the soaking chamber through which the slab ingots pass before being discharged.

Buy McMyler Interstate Business and Plant

Industrial Brownhoist Corporation, Cleveland, has purchased the McMyler Interstate Co., Bedford, Ohio. The McMyler plant, machinery and materials are not included in the purchase, but manufacturing operations and the business of the McMyler company, together with all drawings and records, are to be moved to the Cleveland plant of Brownhoist corporation.

Through the purchase, Industrial Brownhoist, long a builder of locomotive cranes, has acquired a line of products supplementary to its own line. Its products now include a complete line of locomotive cranes as well as crawler shovels, pile drivers, bridge cranes and other types of material handling machinery.

The property, plant and equipment of the McMyler Interstate Co. has been purchased by the Manhattan Machinery Exchange, 30 Church Street, New York. Theodore Friedeberg, head of the exchange, says that a new company may be organized to manufacture the same products which the McMyler Interstate Co. has been making, but if this plan fails the property and equipment will be liquidated.

Jeffrey Mfg. Co. Forms Canadian Company

The Jeffrey Mfg. Co., Columbus, Ohio, announces the incorporation of the Jeffrey Mfg. Co., Ltd., of Canada, Montreal, Que., with head office and works in Montreal, a branch office in Toronto, and a mining supply warehouse in Calgary. Jeffrey chains, portable loaders, elevating, conveying, pulverizing, crushing and mining machinery which for more than 50 years have been manufactured at Columbus, Ohio, will be supplied to Canadian users by the Canadian company.

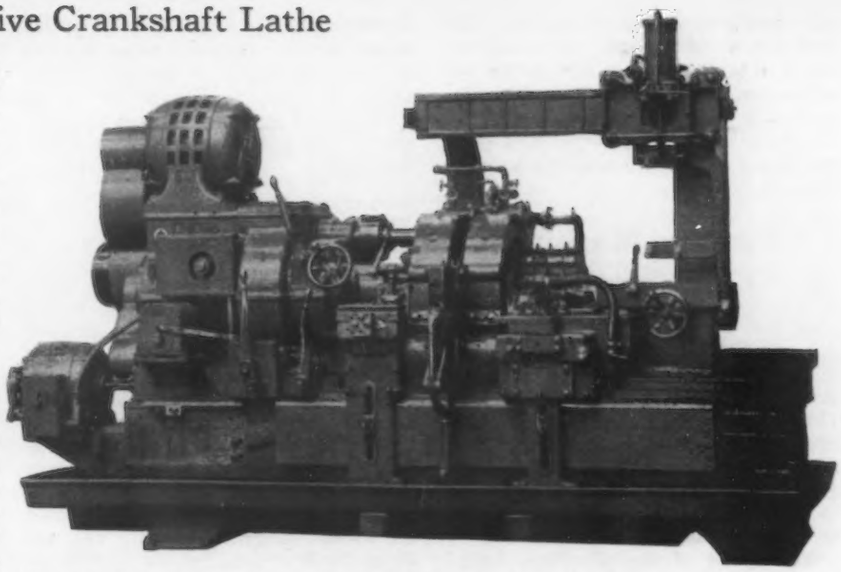
The Jeffrey company recently acquired the Galion Iron Works Mfg. Co. of Galion, Ohio, manufacturer of road machinery, including a full line of gasoline and steam road rollers, leaning wheel road graders, tractor power graders, road drags and road plows. This company also manufactures cast iron and galvanized culverts. The Jeffrey Mfg. Co., Ltd., is to supply the complete line of Galion machinery from its Canadian plant.

Officers of the Jeffrey Mfg. Co., Ltd., are: R. W. Gillispie, president; R. H. Ross, treasurer and manager; F. N. Diehl, secretary.

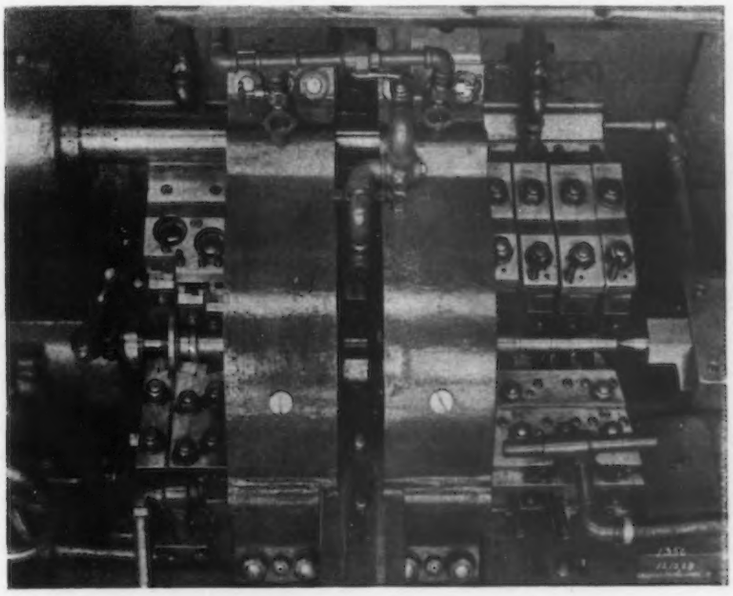
Improved Center-Drive Crankshaft Lathe

A NEW development in crankshaft bearing turning equipment in the form of an improved type of center-drive crankshaft lathe has been announced by the R. K. LeBlond Machine Tool Co., Cincinnati. In the new lathe the center line bearing is turned in the same operation as the flange and stub ends. The feature of the machine is a split center-drive head of the same general principle as that embodied in the present LeBlond type.

The crank of the new lathe is located on milled notches in the webs next to the center line bearing and the clamping is so arranged that the crank is held accurately and rigidly in place. A specially designed narrow tool slide in front and rear forms the center bearing simultaneously with the stub and flange ends and line bearings adjacent thereto. Other elements of the machine are substantially the same as the standard LeBlond 4 AC center drive lathe described in THE IRON AGE of Sept. 15, 1927, page 707. The new lathe is adaptable to turning the two centerline bearings on crankshafts of the six-cylinder seven-bearing type.



Crankshaft Lathe with Center Tool-Slide for Finishing the Center Bearing Together with Flange and Stub Ends. Arrangement of the tooling may be seen in the close-up view below, at left



With this addition, the LeBlond crankshaft equipment for a six-throw crank is complete with three machines. This equipment consists of the 4 AC center-drive lathe for flange, stub and centerline bearings; a 4 AC regular lathe for intermediate line bearings; and a 5 AC lathe to turn all pin bearings simultaneously. For a four-throw shaft, only the center-drive lathe and the 5 AC crankshaft lathe are necessary.

Shipments of springs in April by the Wallace Barnes Co., Bristol, Conn., were the largest in both weight and value in the history of the company, exceeding April, 1928, by 45 per cent.

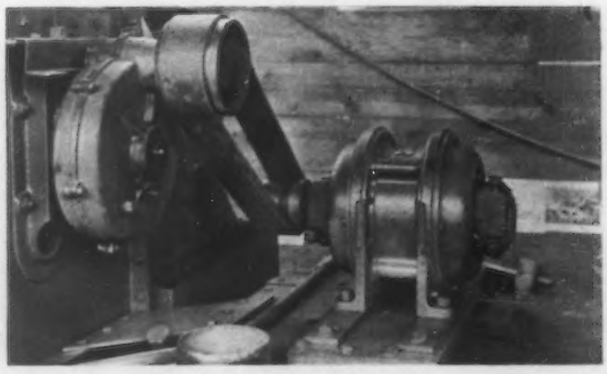
Pinion Motion to Maintain Belt Tension

AUTOMATIC application of belt load tension is claimed for a new short-center drive which is being developed by the American Foundry Equipment Co., Mishawaka, Ind. This drive will be designed with gear ratios up to 1 to 30 and for drives of 50 hp. or less.

It consists essentially of a vertically-split cast aluminum case in which are mounted a pinion and a main gear of the helical type. The main gear is keyed to a hollow shaft, which is keyed to the machine to be driven. This hollow shaft rotates in bronze bushings mounted in the gear case. The pinion gear is keyed to a spindle which is equipped with tapered roller bearings. A pulley is mounted on the extended end of the pinion spindle.

The result of this design is that the pulley and the pinion are keyed to the spindle which is supported by the fulcrum arm centered on the shaft to be driven. Rotation of the spindle by a belt drive to the pulley causes the spindle to tend to make an epicyclic movement around the gear wheel with which it meshes. This movement is restrained by the belt, which is thus put under tension, and the continued rotation of the pinion will rotate the gear and operate the driven machine.

Degree of belt tension depends on



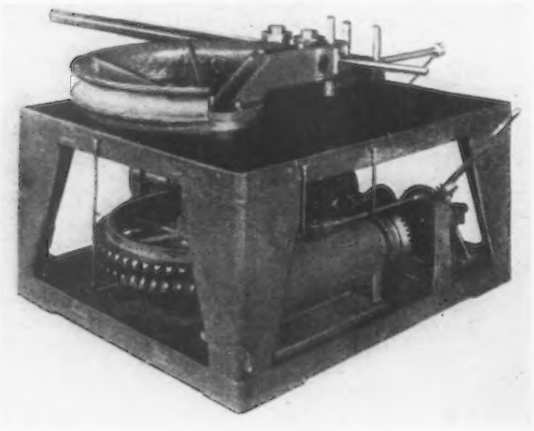
Belt Tension Is Adjusted Automatically According to Starting and Working Loads

the inertia to overcome starting load and the working load. The belt always retains tension for power requirements and belt slack is automatically taken up. Reduction of speed by the gear ratio permits placing motor and driven machine on close centers, and the use of small pulley ratios, so that special devices are not needed to increase the arc of contact, as is the case on short-center drives where speed reduction is accomplished entirely by pulleys of widely varying diameters.

Bending Machine for Pipe, Bars and Sections

A NEW pipe bender that with proper equipment may be used also for bending tubes, reinforcing bars, angles, tees, channels and special sections, has been added to the line of the Wallace Supplies Mfg. Co., 1310 Diversey Parkway, Chicago. Standard forms provide for bending 1¼-in. iron pipe to 7-in. radius; 1½-in. pipe to 9-in. radius; 2-in. pipe to 12-in. radius; and 2½-in. iron pipe to 15-in. radius—all 90 deg. bends.

The speed of the machine, designated as the 6-C, is 2 r.p.m., when directly driven through the worm gears, and 1¼ r.p.m. when operating through back gears. On some classes of work these speeds can be increased. An automatic stop is provided, a movable block on the worm gear serving to stop the machine for any desired number of degrees of bend. The bender can be set into action forward or reverse and also stopped at any point by means of the lever at the front, which operates the fingers of the double-cone clutch mechanism. Bearing lubrication is by means of oil tubes, and the worm and worm gear are inclosed and run in grease. Floor space occupied is approximately 5 ft. by 5½ ft., and the overall height is 42 in. The net weight with 7½-hp. motor is 4350 lb.



BENDING Machine with Dust Guards Removed to Show Driving Gears. The drive may be direct through the worm gears or through back gears

A No. 7-C bending machine of similar construction, but operating at a slightly slower speed, is also built. This bender is furnished with a form for bending 3-in. pipe to a radius of 3 in. and 90 deg. of bend, in addition to the forms regularly furnished for the No. 6-C machine.

Polisher Has Independently-Driven Spindles

A TWO-SPINDLE motor-driven polishing machine with separate motor, starting switch and brake for each spindle has been added to the "Rite Speed" line of the Hill-Curtis Co., Kalamazoo, Mich.

The power is transmitted to the spindle by means of a multiple V-belt. Each motor and spindle can be started and stopped independently of the other and each spindle can be operated at different speeds. Speed changes are made by changing motor pulleys. The combination switch and brake employed is said to eliminate the possibility of applying the brake before cutting off the current. With one push forward on the lever, the brake is released and the motor started; when the action is reversed, the current is cut off and the brake applied.

Either tapered roller or ball bearings can be provided. Standard stock motors can be furnished, and the combination switch and brake, with automatic motor starter having thermal overload protection, is standard equipment. The machines are made in 3, 5 and 7½ hp. capacities for alternating or direct current.

Each Spindle Has Separate Motor, Starting Switch and Brake. Speed changes are made by changing motor pulleys

Furnace for Copper Brazing in Hydrogen

A NEW method for making joints in steel articles was described in THE IRON AGE, May 10, 1928, whereby the articles, previously painted with copper powder, are heated in an atmosphere of hydrogen and nitrogen. The effect of the gaseous atmosphere is that of a flux, cleaning the work and causing a very smooth flow of the copper (when it becomes hot enough to melt) over the surface to be brazed, and into the joints. The method may be called "hydrogen brazing" or "coppering." The elevated tunnel furnace described about a year ago is now being manufactured for sale by the originators, General Electric Co.

In operation, work set on trays is elevated into the furnace through a trap door in the bottom, automatically pushed through a heating and cooling zone, and removed at the far end. Since all hot parts in the furnace, such as trays or roller conveyor, are in a hydrogen atmosphere, no scale or deterioration occurs even at a temperature above the melting point of copper.

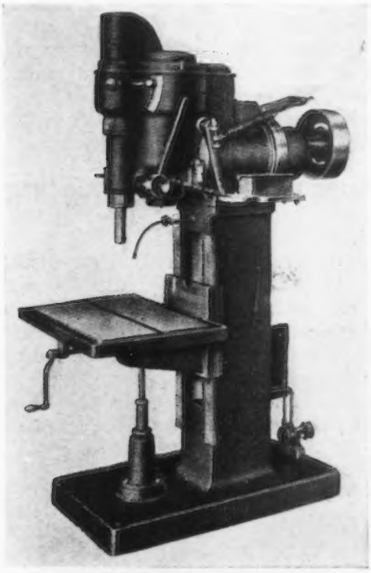
Adequate electrical control is included so the speed may be adjusted over a wide range. Operation is fully automatic except for bringing loaded trays to the furnace, and taking the completed work away.

Melting Pot Has Bottom Pouring Spout

AN electric metal melting pot (Type RP, Form F) with a bottom pouring spout, has been announced by the General Electric Co. The bottom pouring feature is particularly applicable in cases where it is impractical to ladle and where large quantities of metal are handled. It is designed for melting lead, babbitt, tin, solder, type metal and similar alloys or metals, except spelter or zinc, at temperatures not exceeding 950 deg. Fahr.

Improved Heavy-Duty Pneumatic Tapper

THE W. Gaterman Mfg. Co., Manitowoc, Wis., is building a No. 5 heavy-duty pneumatic oscillating tapper which is similar in design and principle to the No. 10 machine described previously in THE IRON AGE. It can be furnished in two ratios from the clutch-spindle to the tap-spindle. One ratio gives a capacity of ⅛ to ½ in. U.S.S. in steel, with spindle speeds of 425, 575, 750 and 1000 r.p.m., and the other gives capacity ranging from



(At Left) Pneumatic Tapper with Two Ratios of Drive from Clutch to Tap Spindle. The method of returning the spindle has been improved

¼ to ¾ in. with spindle speeds of 212, 285, 375 and 500 r.p.m.

The machine embodies the principle of hand tapping employed in the company's previous designs. When the torque, or load to the tap, is more than a dial-set predetermined resistance the tap will back up, free itself and then go forward again, this movement being actuated so rapidly that it is almost unnoticeable. As soon as the resistance to the tap is less than the predetermined, the spindle will not oscillate, but will move forward until the tap reaches the proper depth, when it will reverse and back out of the work. In the Nos. 5 and 10 machines this oscillation is also carried out in the reverse motion of the tap spindle, which is an advantage when tapping deep or blind holes, and without changing the rotation of the clutch spindle.

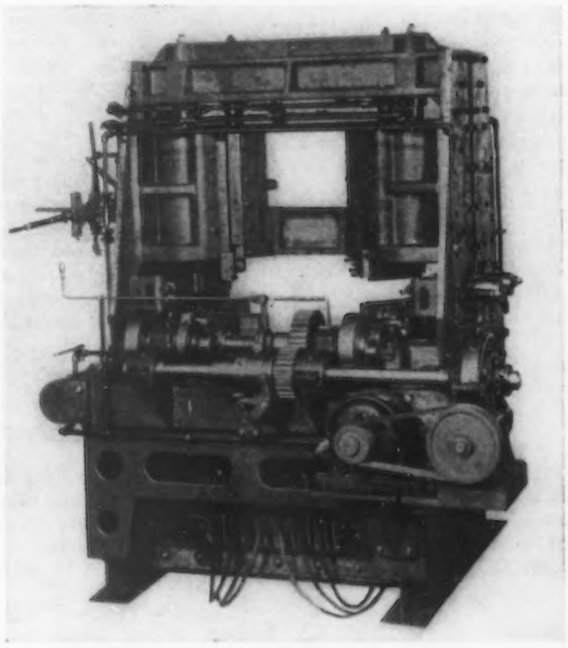
The machine is of box construction. The transmission, forward and reverse gear and clutch, spindle feeding and other parts are preassembled units that may be removed for adjustment and repair. All moving parts are inclosed and run in oil. Power is transmitted through a six-speed sliding gear transmission. Clutches are controlled pneumatically. The air cylinder mounted directly on top of the clutch spindle engages the clutches from reverse to forward. As soon as the tap has reached the proper depth a stop trips the valve that feeds the clutch cylinder, and a compression spring underneath the forward clutch forces the latter out of its seat. Thus air is used only for forward rotation of the clutch spindle. The pneumatic control valve is operated from the spindle feed lever shaft. Air pressure of 30 lb. is required.

Hand lever feed to the tap spindle is regularly furnished but a pneumatic spindle feed and foot trip can be provided. With the air feed, the tap advances quickly to and from the work. A depth stop trips the feed at a uniform depth, the variation being one-quarter revolution above or below the set depth.

Timken bearings are extensively employed and lubrication of the machine is by splash and force feed systems. A 1½-hp. 1750-r.p.m. motor is recommended for the No. 5 tapper. Special spindles and quills can be furnished for multiple tapping heads, as well as automatic indexing and other work-holding fixtures and magazine feeds. The machines are built with two tapping heads mounted on the same column and as combination tapping and drilling machines.

Automobile Cowls Welded By Special Machine

ALTHOUGH built to meet the particular requirements of a large manufacturer of automobile bodies, the cowl welder illustrated is adapted for use on cowls of various shapes, and with minor changes can also be made suitable for butt welding thin sheets up to approximately 44 in. in width.



(At Right) Automobile Cowls May Be Welded Rapidly. With minor changes, the machine can be used for butt welding 44-in. and narrower sheets

The machine is made up of heavy steel castings, steel plates and structural shapes. There are four vertical clamping cylinders, operated from a single Oilgear pump, and also four small horizontal cylinders for clamping the vertical flanges on the outer edges of the cowl. The push-up pressure and movement is obtained through direct motor driven cam having a cycle of 7 sec., the speed reduction between the motor and the camshaft being obtained through a Texrope drive and standard gear reduction unit. Because of the width of the machine two identical cams, mounted on a common shaft, are used for obtaining the push-up movement and pressure. The return of the movable platen to the open or loading position is by means of two air cylinders.

The transformer is rated at 250 kva., and current regulation is obtained through separate auto transformer. Special features for alining and backing up the clamping dies are incorporated. The machine, built by Thomson Electric Welding Co., Lynn, Mass., weighs approximately 30,000 lb. It is designated as the model 502 cowl welder.

Postponement of the first American Fair, the annual national merchandising exposition which was to have been held in August in the Atlantic City Auditorium, was announced today by the American Fair Corporation of New York. The fair will be held from Aug. 2 to Aug. 24, 1930.

Polishing Machine with Texrope Motor Drive

RIGID one-piece base of gooseneck design and Texrope drive from motor to spindle are features of the new "Texdrive" buffing and polishing lathe built by the Hisey-Wolf Machine Co., Cincinnati.

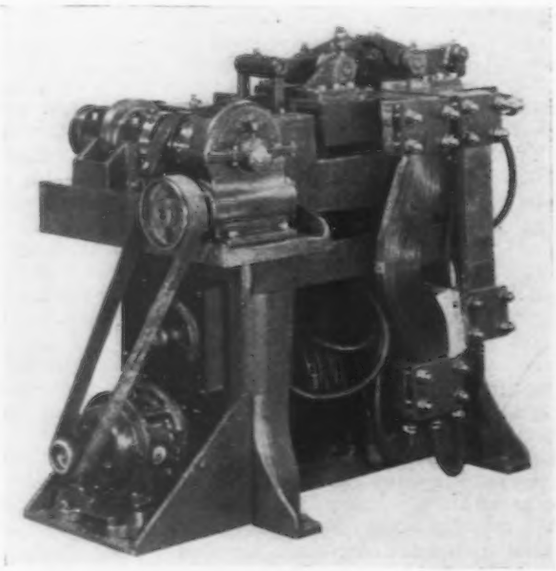
THE Motor May Be Moved Conveniently to Obtain Proper Tension of the Texrope Drive. The base is heavy and of gooseneck design for convenience of the operator

The motor is mounted on a flat base attached to the main frame. The base has planed ways on which the motor slides to secure proper belt tension, no idler pulley being necessary. Large doors give easy access to the motor, as well as to the motor starter, which is mounted on the inside of the door, as shown. Louvres in the end door keep out dust but permit circulation of air. The starter is of automatic type, providing protection from low voltage, phase failure and overload. The switch is mounted inside of the base, and the starting button is flush with the front of the column and is therefore protected.

The large nickel steel spindle is in one piece, and is mounted in either ball bearings or Timken roller bearings. Dust covers on the bearing housings are provided with a labyrinth seal to exclude dust and dirt. To assure permanent alinement the bearing boxes are keyed to the column, the key of the bearing housing being arranged to slide in a keyway on top of the column. The lubrication system includes oil chambers that are filled through convenient cups, and oil level indicating gages. A plug is provided at the bottom of the housing to facilitate flushing the bearings. The safety wheel nut is of Tobin bronze and the threads are flat top type. The pulley hood is dust-proof and may be removed conveniently.

Automatic Machine for Corner Welds

THE Thomson Electric Welding Co., Lynn, Mass., has developed a power driven butt welder, especially convenient for making tee welds or welds at an angle (commonly termed miter welds) such as are encountered on window sash or other light frames. By means of various types of clamps, the machine will also join flat strip up to 4 in. wide, or bars or pipe having less than ½-sq. in. cross sectional area.



BUTT Welder for Tee and Miter Welds. Air-operated clamps controlled by foot actuated valves can be provided for handling 4-in. and narrow stock and for tubular members having a cross-section of ½ sq. in. or less

The view shows a rear elevation of the machine stripped of protective guards. Clamps are air operated, and controlled by foot or hand levers. The rear platen is movable; automatic control of the entire cycle is had by the motor, driving through belt and gear reduction unit to the camshaft above. This cycle may be arranged to be less than fully automatic; the clamps may also operate in unison or independently. Return of the moving platen to open or loading position may be either by hand or automatic through release of the clamps. Speed varies from 10 to 20 welds per minute. The transformer in the base is rated at 60 kva. All electrical and moving parts are completely protected from flying sparks from the flash.

Special Rotary Graduating Machine

FOR graduating a 12¼-in. diameter aluminum disk with 400 divisions and numbers at every five divisions the Noble & Westbrook Mfg. Co., Hartford Conn., has designed the equipment here illustrated. The numbering and graduating is rolled on at one operation by means of steel marking dies that are held in accurate position by specially cut gears.

The Disks Are Graduated Into 400 Divisions with Numbers at Every Five Division Lines

The marking dies are made in sections and are removable. They are mounted on the carrying wheel located immediately below handle, while the disk to be graduated and numbered is attached to the other gear as shown. The pressure necessary for rolling the graduations and numbers on the work is applied through a foot treadle and a lever carried inside of the column. The machine is operated by hand crank. Completely equipped it weighs 375 lb.

General Electric Co. sales billed for the first three months of 1929 amounted to $83,385,015.49, compared with $71,640,790.40 for the corresponding period last year, an increase of 16 per cent. Profit available for dividends on common stock for the first quarter of 1929 was $13,862,298.06, compared with $11,261,842.71 for the corresponding three months last year. Orders received set an all-time record.

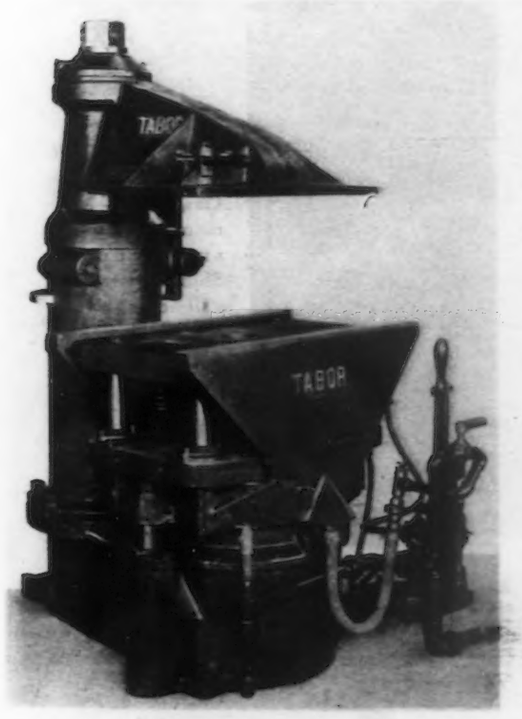
Special Shockless Jarring Molding Machine

ONE of the new molding machines displayed at the recent exhibition of the American Foundrymen's Association, in Chicago, April 8 to 11, is shown in the illustration. It is a Tabor shockless jarring, squeezing flask lift machine with an 18-in. squeezing cylinder, 6½-in. jarring cylinder and a 4½-in. draw cylinder, made by the Tabor Mfg. Co., Philadelphia. The machine is designed to take pattern plates 14 in., 16 in., 18 in. or 20 in. wide up to 36 in. long. The pattern plate support is 14 in. wide and the head of the machine is adjustable for the above sizes. It can be furnished with flask lifting sides, as shown, or with adjustable lifting posts when so desired.

The distance between the pattern plate and yoke is optional. The height from the floor to the pattern plate is 32 in. and the total height of the machine is 56 in. The distance between the pattern plate and yoke is 12¼ in. The yoke is controlled by a lever on either the right-hand or left-hand side, depending upon the location of the valve stand. This automatically locks the yoke in the front squeezing position or in the back pattern draw position, and is spring operated. This spring operation requires a minimum amount of effort by the operator. The location of the valve stand is optional; it can be in front, as shown in the illustration, on either the right or left-hand side, or at the rear of the machine.

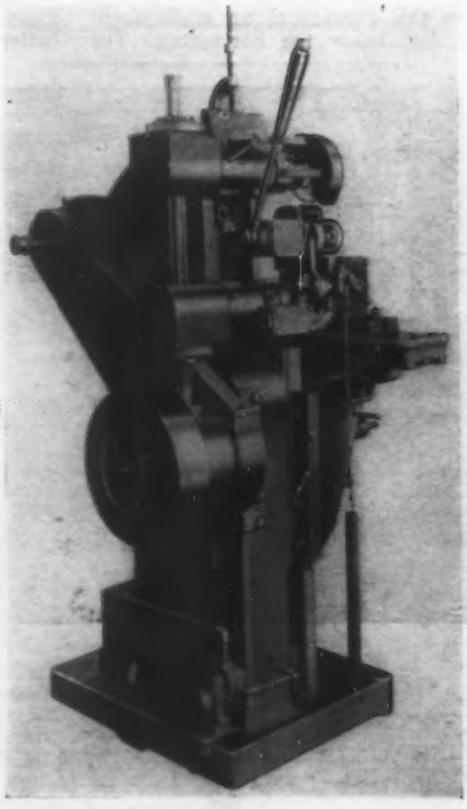
The yoke is mounted on two Timken taper thrust bearings. Guide rods are sand proof. The draw is oil controlled; the squeezing and pattern draw are controlled by one lever which is provided with a latch to hold the flask after drawing the pattern. Full 14-in. guide is provided throughout the entire travel of the pattern draw.

Air consumption, at 80-lb. pressure, is 13 cu. ft. and the total net weight of the machine is 3400 lb. The jarring and draw capacity is 600 lb. with 80-lb. air pressure available.



(At Left) Pattern Plates from 14 to 20 In. Wide and Up to 36 In. Long Can Be Used. The machine can be furnished with flask lifting sides or with adjustable lifting posts

(At Right) Both Slots Can Be Milled in Aluminum Pistons At Rates Ranging from 600 to 1000 Pieces an Hour, Depending Upon Piston Size



Double-Spindle Miller for Piston Slitting

ALTHOUGH here shown set up for slitting pistons, the double-spindle opposed-feed milling machine recently brought out by the Kent-Owens Machine Co., Toledo, is adapted for a variety of similar operations. In milling both slots in the skirts of aluminum pistons, production of 600 to 1000 pieces an hour, depending upon size, is claimed.

Except for placing and removing the work, the piston fixture is automatic. As the hand lever is brought down and the heads approach each other, the piston blank is clamped automatically before the cutters strike it. After the cutting is completed, the cutters are withdrawn from the work by raising the hand lever and the work in the fixture is unclamped automatically.

A counterbalanced feed arrangement through rack and pinion facilitates operation. Both spindles, as well as the backshaft, are mounted in Timken roller bearings to permit operation at the high speeds necessary for small-diameter cutters and for milling brass, aluminum and other soft materials. The spindle drive is through silent chain, splined shaft and hardened alloy steel bevel gears mounted in ball bearings. Knee, cross-slide and table bearings are large. Large chip troughs surround both base and table and the coolant tank is cast integral with the base. Working surface is 22 in. long by 5 in. wide with a standard ⅝-in. T-slot provided for the table. The distance between the spindles is 4¾ in. minimum and 12¼ in. maximum. Horizontal table feed of 4 in. is obtainable by hand lever and 17-in. feed by crank. The cross saddle-feed is 5 in. Lever feed movements are adjusted by positive stops. The spindles are heat treated and ground and have a No. 9 B&S taper hole.

The machine can be furnished for either belt or motor drive, a 3 to 5-hp. motor being recommended for the latter. The floor space required is 34⅛ by 48¾ in. The net weight of the machine is 1400 lb.

Associated Machine Tool Dealers will hold their annual convention on May 27 and 28 at Granville, Ohio.

Ladle Preheated in Novel Way

Pushed Up Against a Fire-Brick Wall, Forming a Small Furnace, Gas-Heated

FOR the purpose of bringing ladles up to the required temperature before pouring molten metal into them, the Dayton Steel Foundry Co., Dayton, Ohio, has installed a ladle preheating station, as illustrated. The ladles used in this plant are of 3-ton capacity, but the system could be applied just as well to ladles of other sizes, and to ladles in iron foundries as well as steel foundries.

The vertical fire-brick wall seals the mouth of the ladle, converting it into a compact closed furnace. The gas burner, piercing the wall, fires into this furnace at an angle about 30 deg. below the horizontal. The heat is directed toward the lower wall of the ladle, resulting in a complete sweep of its entire wall area.

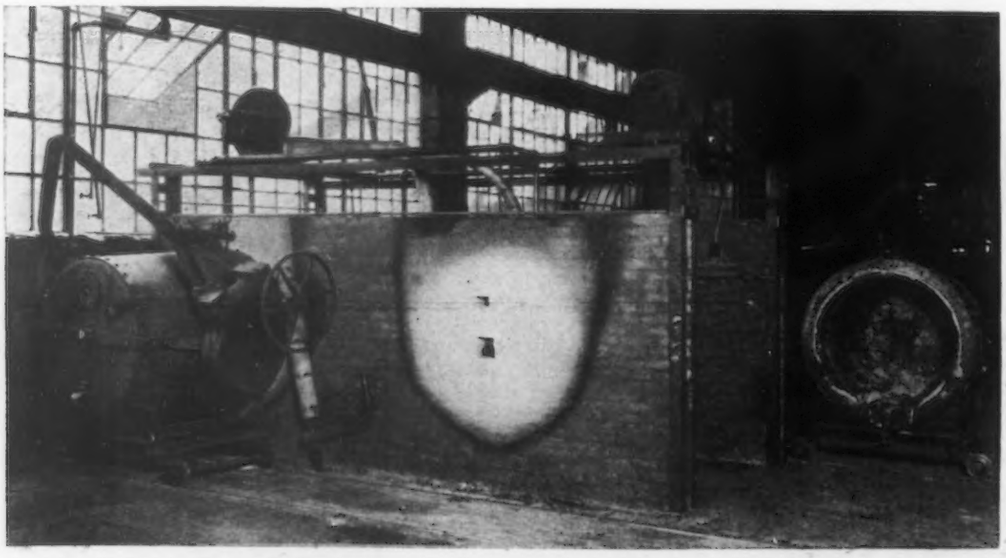
This circulation of the hot gases, it is stated, produces a very uniform heating of the lining, and with great economy. The ladles are brought to 900 deg. Fahr. in 12 min. These walls have been in use for over a year without signs of wear.

For the greater utilization of floor space in the main foundry, the ladle heaters were placed in an off-set of the building. This necessitated a method of handling the ladles by means of cars, as shown. The drained ladles are laid on the cars by the pouring crane and at once removed from the operating zone.

All work performed on the ladles is done on the cars—stopper changing, patching, renozzling and relining. They are then pushed up to the heating wall and heat is applied. This method is found convenient and is economical in both labor and space.

One view shows the arrangement of gas burners, with the fan supplying low-pressure air for four burners of about 1000 cu. ft. natural gas capacity each. Proper lighting and sight holes were left in the wall, with a flexible-tubed gas torch for lighting.

The ladles had previously been heated with fuel oil by means of compressed air oil burners. It is estimated that over $1,000 is saved annually in fuel costs alone, besides the many intangible economies that accrued through the new process.



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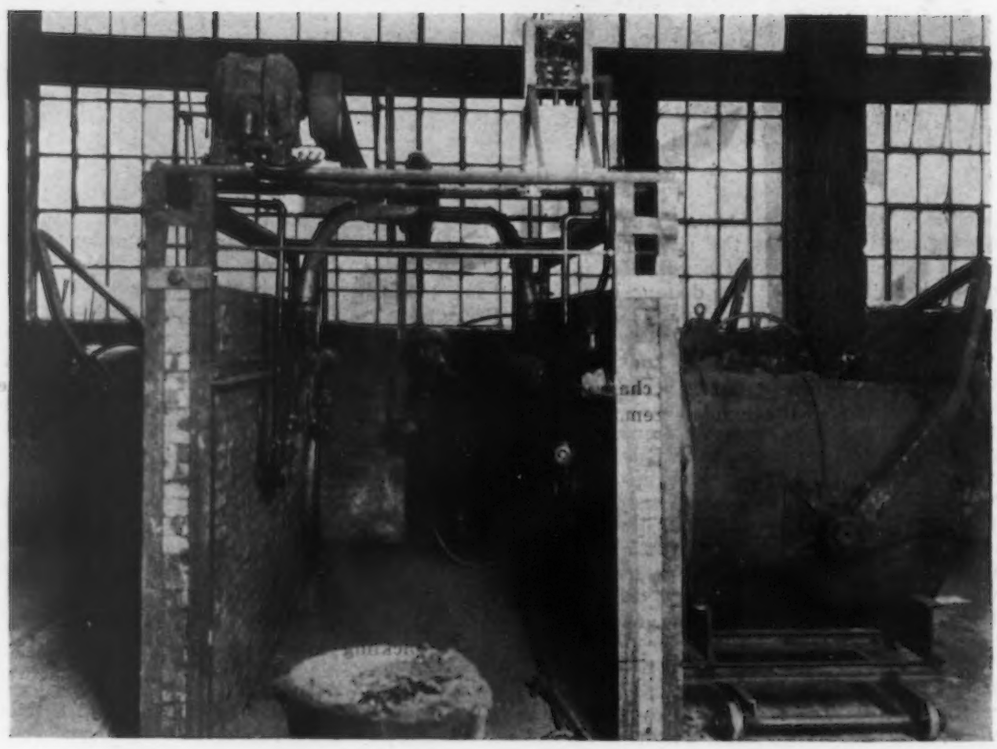

CONTROLS for Ladle Heating Are in the Aisle Between the Two Walls, Provision Being Made for Four Ladles. The blower and motor are mounted above

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Strength of the case controls the strength of the hardened part. In designing parts to be case-hardened, do not base your estimates on the core strength alone, for if the case fails the part must be replaced.—Page 1272.

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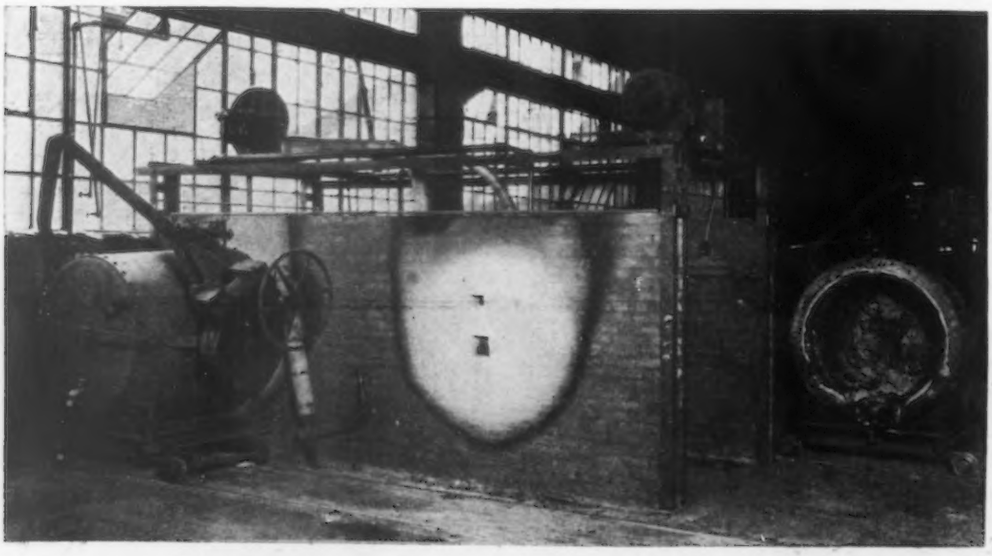

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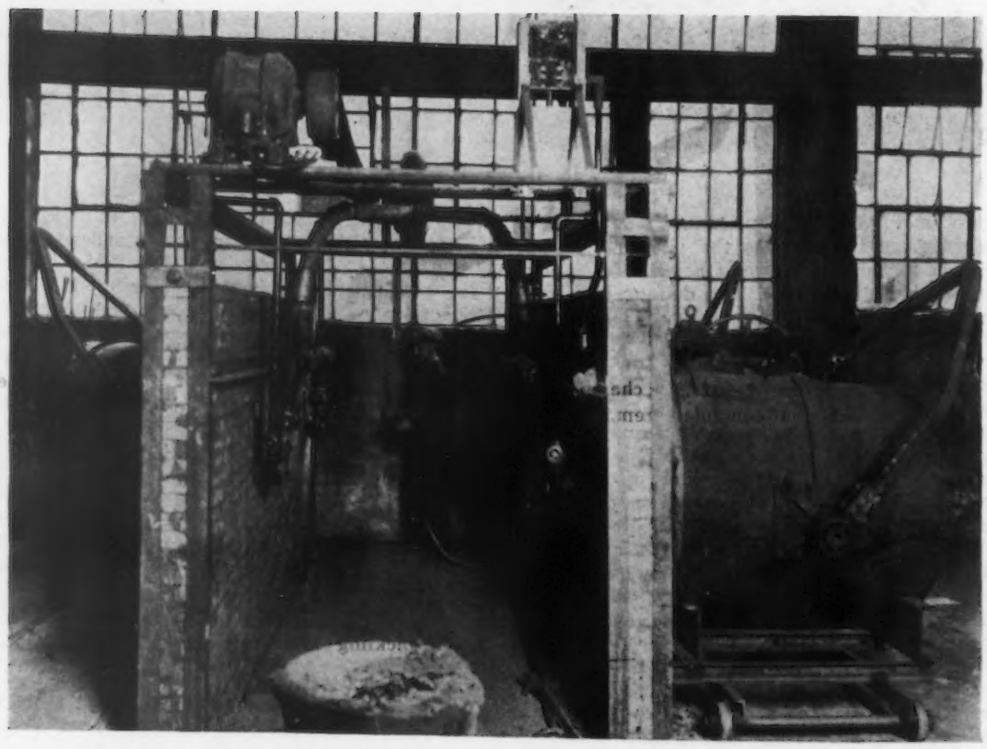

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A. I. FINDLEY
Editor

THE IRON AGE

W. W. MACON
Managing Editor

ESTABLISHED 1855

An Aid to Forecasting

THE IRON AGE'S estimates again are proved dependable. In its first issue of January it put the production of steel ingots in the year just ended at 50,400,000 tons. The compilation of the American Iron and Steel Institute, made public last week, showed that it was 50,325,393 tons. Thus THE IRON AGE was too high by about one-seventh of one per cent. Similarly the 1928 output of rolled steel was given by THE IRON AGE on Jan. 3, 1929, as 37,300,000 tons, whereas the official returns as of April 30 put it at 37,178,000 tons.

Various steel companies—including the largest of them—made use of THE IRON AGE'S statistics at the turn of the year to check up their own share in the business of 1928 and in the light of that showing to lay their plans for 1929. It is gratifying to know that none of these calculations based upon our statistical work have required revising in view of the institute publication of four months after the opening of the year.

Recent Trends in Finished Steel

NINETEEN TWENTY-EIGHT saw some sharp changes in tonnage outputs of finished steel products. These were few in number and therefore all the more notable. Conspicuous points were the passing of seamless tubes into the million-ton class and the attainment of two million tons of strips when it was only in 1925 that strips entered the million-ton class. Yet with all this increase in strip output the production of sheets showed a very substantial gain.

Detailed comparison of the 1928 production statistics, which were issued last week by American Iron and Steel Institute, is best made with the year 1926, since 1927 was an off year. The total finished rolled iron and steel, 37,662,916 tons, gained 6.1 per cent over 1926, which is less than the 7.2 per cent increase shown by steel ingots. The divergence is due chiefly to the fact that finished rolled iron dropped from 676,854 tons in 1926 to 484,977 tons in 1928. The relation of rolled steel to ingots was substantially the same, a shade over 74 per cent in 1926 and a shade under 74 per cent in 1928.

Rarely has there been such a period of sweeping changes in the character of steel demand. From 1926 to 1928 there were three important decreases—570,156 tons in rails, 287,554 tons in plates and 395,577 tons in skelp, while miscellaneous, unclassified, decreased 138,458 tons. These four items total 1,391,745 tons, which with a net increase of 2,167,024 tons in the total of rolled iron and steel makes the remarkable total of 3,558,769 tons increase to be accounted for in other finished products. Seven-eighths of this tonnage is accounted for by five commodities, which had exceptional increases, as follows:

Increases, 1926 to 1928

	Gross Tons
Sheets	724,931
Strips	939,569
Merchant bars	803,999
Rods	358,784
Blanks for seamless tubing	307,060
Total	3,134,343

The large decreases in three products and the still larger increases in a few others, all in the brief space of two years, illustrate how necessary it is for the steel industry to have a large excess of finishing capacity in order to meet sharp changes in the character of demand. The finishing departments are highly specialized and an excess of capacity in one department does another department no good. Profits on the material sold must be adequate to cover the expense of idle capacity which the buying public does not at times care to use.

A notable point in the comparison between 1926 and 1928 is that sheets, strips and merchant bars, which showed the remarkably large increases from 1926 to 1928, are the very commodities in which capacity has been strained in the last few months, such mills having fallen several weeks behindhand in filling orders. Thus the current year gives promise of showing further and large gains in these lines, while already it is clearly indicated that there will be a further decrease in rail production.

"Making Money"

"ENTIRELY too much stress," says Julius Rosenwald of Sears, Roebuck & Co., "is put on the making of money. That does not require brains. Some of the biggest fools I know are the wealthiest. As a matter of fact, I believe that success is 95 per cent luck and 5 per cent ability. Take my own case. I know that there are any number of men in my employ who could run my business just as well as I can. They did not get the breaks—that's the only difference between them and me."

These remarks have been widely quoted, and emanating from a business leader, so successful and so lovable, they should not go unchallenged, for it seems to us that they are essentially erroneous and mischievous. If financial success were chiefly a matter of luck there would be strong grounds for the surtaxes that governments so savagely levy on large incomes, for the voraciousness of unionized labor, and

for the leveling processes of socialistic doctrine. This is indeed the very negation of the theory that men get what they earn or earn what they get.

To almost all rules there are exceptions. It is undeniable that the winning of the Calcutta sweepstakes is a consequence of luck. It is also undeniable that in the romantic days of the mining industry some bonanzas were discovered by pure luck. We may suggest, however, that persons who have stumbled into fortunes in such ways usually have not had brains enough to retain them, which rather implies that brains do tell.

There are not a few men who have derived fortunes from the exploitation of a single idea, which after revelation and development has appeared so simple as to be almost ridiculous, anyway obvious. Even the fortunes that have come out of the business of Sears, Roebuck & Co. may be so viewed. But what of the brains that conceived the idea, the toil and perseverance in promoting it! Indeed it requires brains to recognize when Opportunity knocks. American industry and American industrial fortunes have not grown big out of happy thoughts and easy going.

An occasional fool may become rich by luck. A genius, like Einstein, may prefer to disregard wealth and give himself to science and the enjoyment of fame. Among exceptions there are gradations from such extremes; but after all there are relatively few variants in the great scheme of nature. And as a broad generalization it may be assumed that a man's earning capacity is a rough measure of his ability. The intelligence tests that were made of a great sample of our youth during the war evinced that human beings sort themselves out among vocations in general accordance with their mental capacity. A certain grade of mind characterizes the hewers of wood and drawers of water. Another grade makes barbers and waiters. A higher one makes artisans; and so on upward. A carpenter may average $2,000 a year as being all he is worth, and no piece of luck will help him. If an executive receives $50,000 a year it is pretty certain that he is cheap at that price. Also it is certain that if he is thrifty he will save from his earnings, will invest wisely and will achieve fortune of greater or less proportions and there will be no luck about it.

Motor Car Saturation and Exports

THE remarkable output of automobiles has again raised the question whether the saturation point has not been reached. Although there may be reason to believe that domestic business in motor vehicles will soon be on a replacement basis, except to take care of increases in population, manufacturers look for many more years of expansion in foreign trade.

Exports of automotive products in March reached a new peak valuation of $78,325,000, a gain of 27 per cent over the previous monthly record, made in February. For the first quarter the total value was $187,448,000, or nearly $59,000,000 more than for the corresponding period in 1928. Of the total number of passenger cars manufactured in the United States in March, 10 per cent was for shipment to other countries. More than 35 per cent of the motor truck output was for export.

Leading motor car builders are well prepared to take advantage of growth in foreign demand. Sales offices and service stations dot the globe, and assembly plants and branch factories have been located at strategic points. To build up good will one of the largest makers of automotive products is adhering to the policy of buying all materials possible, even at a sacrifice in costs, in countries that are being cultivated. To the same end branch factories are rapidly becoming self-contained. It will take a long time, however, before such plants can make a full line of motor vehicles, and meanwhile American plants will be called upon to handle a large share of the world trade that develops.

Changes in Steel Making Capacity

THE annual finding of the American Iron and Steel Institute as to iron and steel making capacity, published in THE IRON AGE of April 25, sets the steel ingot capacity as of Dec. 31, 1928, at 61,759,466 tons. On the mere face of the returns there was 3.9 per cent increase during 1928 and 18 per cent increase during the ten years since the war. There is a great deal more in the matter than that, however. A proper study of the available data shows that while the apparent increase in ten years by the bare figures was 9,411,046 tons the actual increase made by the expenditure of money and energy was 3,000,000 to 4,000,000 tons more, the difference being made up by abandonment of equipment, through its being obsolete or otherwise high-cost, or through its being for the production of material no longer wanted, particularly Bessemer and crucible steel.

For Dec. 31 of each year from 1913 to 1924 inclusive the institute reported capacity merely by adding the returns made to it, no effort being made to scale down the figures. In 1925 a new system was instituted to eliminate the improbable, and the capacities reported for Dec. 31, 1925 to 1928 inclusive, are substantially trustworthy. On account of the change in style there has been little disposition to make long-range comparisons of capacity, but this can be done and very interesting and important conclusions reached, showing that it has been necessary to abandon a great deal of equipment. To do that the steel industry must make profits.

By the change in system in 1925 it appeared that during the year steel ingot capacity decreased 2,594,387 tons, whereas in actual capacity there was some increase. No doubt the popular impression was that there was simply a general scaling down. Comparison of the figures for individual processes shows an increase of 647,505 tons in basic open-hearth, with decreases of 337,700 tons in acid open-hearth, 2,713,250 tons in Bessemer, 76,544 tons in crucible and 114,398 tons in electric.

These tonnages could not have been written off at the end of 1918, because men did not know what was coming, but we may now take it that the capacity at the end of 1918, capable of earning money in future, was approximately the 52,348,420 tons reported minus the eliminations afterward made, or by precise computation 49,106,528 tons. The bare figures thus show an increase of 12,652,938 tons, or 26 per cent, in ten years to the present.

Statistical support for dating these eliminations back to 1918 is furnished by taking the capacities in

the different processes and observing production afterward accomplished. Relative to the basic open-hearth capacity reported for Dec. 31, 1918, there was actually produced, in 1923, 87 per cent as much, which is not so bad. On the other hand, of the acid open-hearth capacity at the end of 1918 only 50 per cent was produced in 1919, and less in each year since. Of the Bessemer capacity there was 75 per cent in 1920 and less in all other post-war years. Electric steel showed 49 per cent in 1920 and less in other years except 1927 and 1928. Crucible showed 62 per cent in 1920 and has since disappeared almost entirely.

The increase in basic open-hearth capacity in ten years has been from 38,217,010 tons to 51,389,625 tons, or 34.5 per cent. Absolute new construction of open-hearth furnaces as reported annually by THE IRON AGE amounted to 5,920,000 tons, or 45 per cent of the total increase. The remainder came from enlarging furnaces, improvements in equipment and simply generally increasing efficiency. In most cases the main effort was not to increase capacity but to reduce cost. Thus the steel industry cannot keep itself from growing.

AN example of the way trade names persist long after they cease to have precise meaning came out of the recent meeting of the American Welding Society. One speaker favored Norway iron welding rod for certain work. Inquiry among equipment suppliers drew out the opinion that most "Norway Iron" welding wire sold in the United States is dead soft steel made in Sweden!

Meetings as Endurance Tests

WE have called attention more than once to the tendency to crowd into engineering and other technical meetings a vast amount of material, far beyond the capacity of any individual to absorb. In many instances simultaneous sessions have been held, usually on dissimilar topics. But not always has it been found possible to keep the schedule so clear of conflicts that none could complain of having to miss a good thing because of attendance at another session.

Usually the program has provided gaps, giving members a chance to catch their breath and tighten their belts for a fresh go. But at last week's meeting of mechanical engineers in Detroit these breathing spaces were conspicuous by their absence. Technical sessions were arranged for afternoons and evenings—at 2 and 8 o'clock—while mornings were filled to overflowing by the plant inspection trips. And because of the ground to be covered (literally) in these plant visits—yes, mileage is the word—the start was scheduled each morning at 8.

The very hospitable committee in charge really had too many good things to offer. Evidently it reasoned that its engineer guests were all well seasoned eclectics with sufficient convention background to save themselves at the same time from the Scylla of mental dyspepsia and the Charybdis of physical exhaustion.

CORRESPONDENCE

Steam Operated Forging Hammers

To the Editor: We are much interested in the article on forging by Mr. Holloway Kilborn appearing in your issue of April 11. A view of one of our hammers is used to illustrate the article. The caption beside this photograph should refer to the hammer as a double-frame forging hammer. The term "drop hammer," used in the text as well as caption, is probably a contraction of drop forging hammer, and it is applied to hammers intended to make drop forgings. Drop hammers are intended for use with impression or closed dies, and it is typical of them that they are provided with means for accurately alining the top and bottom dies. In the hammer illustrated the anvil is entirely separate from the rest of the hammer and even rests on a separate foundation. We believe that the usual drop hammer construction is to have the frames or uprights mounted on the base or anvil; the frames do not rest on the concrete base.

In steam or compressed air operated hammers, either forging hammers or drop hammers, if it is desired to strike a dead, clinging blow, the control levers can be manipulated so that there is no steam cushion under the piston. The steam force is regularly used against the force of gravity to reduce the force of the blow, but the principal means by which the steam hammer secures the flexibility of operation that distinguishes it from a board drop hammer, for example, is by varying the length of the stroke and consequently the velocity and kinetic energy of the ram at the moment of impact.

We disagree with the statement that the practical limit of size for board drop hammers is about 2500 lb. Going over our sales records for the last year or so we find that 65 per cent of our board drop hammer shipments have been hammers rated at 2000 lb. or larger, and 16 board drop hammers rated at 4000 lb. or larger are included in the list.

As to rating steam hammers, it has been our experience that the universal method is not "according to the weight that it would be necessary for a free falling ram to have to give an equal blow," but rather by the nominal scale weight of the reciprocating parts. In the case of single-frame and double-frame forging hammers, the reciprocating parts include the piston, piston rod, ram and top die, since the latter part is usually furnished by the hammer manufacturer. In the case of steam drop hammers, the reciprocating parts included are the piston, piston rod and ram, since the dies are usually made by the user and there is considerable variation in size.

In the steam drop hammers manufactured by our company the actual scale weight of the reciprocating parts is much greater than the nominal weight on which the hammer is rated. For example, in our standard 5000-lb. steam drop hammers, the average weight of the ram, rod and piston is 6600 lb. The area of the top of the piston is 227 sq. in., so that, assuming a mean effective steam pressure of 80 lb. per sq. in., the steam force acting downward is about 18,200 lb., and the total force, not including the top die, about 25,000 lb. On these assumptions the equivalent freely falling weight is five times the rated size of the hammer.

MACDONALD S. REED,
Sales Engineer, Erie Foundry Co.
Erie, Pa.

Few Changed Rates in New Tariff Bill

Pig Iron and Manganese Ore Remain Unchanged—Plan Made for Quicker Response to Competitive Conditions

WASHINGTON, May 7.— Reclassifications, broadened phraseology and additions of new products were the principal changes made in the metal schedule of the readjusted tariff bill introduced today in the House of Representatives by Chairman Hawley of the Ways and Means Committee. Not many changes were made in rates on raw and rolled iron and steel products, but in a few instances the new classifications will provide somewhat higher duties than those now prevailing.

The rate of $1.12½ per ton proclaimed by President Coolidge on iron in pigs was incorporated in the schedule. This rate had been increased under the flexible provision from the original rate of 75c. per ton.

The rate of 1c. a lb. on contained manganese was continued on manganese ore. Alloy scrap was separated from the general scrap rate of 75c. per ton and given higher rates. These rates are compensatory duties of $1 a lb. on the vanadium content in excess of one-tenth of 1 per cent; 72c. a lb. on tungsten content in excess of two-tenths per cent; 65c. a lb. on molybdenum content in excess of two-tenths per cent, and 4c. a lb. on the chromium content in excess of two-tenths per cent. These changes, like a number of others, were made to clarify the law, particularly where the products affected have been the subject of litigation and have been classified by court or treasury decisions.

The rate on tungsten ore was increased to 50c. a lb. from 45c. on the metallic tungsten content.

New products include: silicon aluminum, aluminum silicon, alsimin, ferrosilicon, aluminum and ferroaluminum silicon, which were given a rate of 5c. a lb.; boron carbide, chromium carbide, vanadium carbide, chromium nickel, chromium silicon, chromium vanadium and manganese copper, 25 per cent ad valorem; ferroaluminum vanadium, ferromanganese vanadium, ferrosilicon vanadium and ferrosilicon aluminum vanadium were made dutiable at 25 per cent. This duty also was applied to barium, boron, calcium, titanium, uranium, vanadium and related metals, alloys of two or more of these metals or alloys not specially provided for of one or more of the metals aluminum, chromium, cobalt, copper manganese, nickel or silicon.

Concrete reinforcement bars were placed in the general billet, bar and shape paragraph and given the same duties as that product, which range from 20c. per 100 lb. upward. Hollow bars and hollow drill steel valued at more than 4c. a lb. were given a compensatory duty of 1.3c. a lb. over the duties in the ingot, billet, shape and bar paragraph.

By a new classification higher compensatory duties were placed on alloy steels. Sheet piling was incorporated in the structural paragraph and given a duty of one-fifth per cent per pound.

Wire rods were made dutiable at 20 per cent ad valorem in place of the present rate of six-tenths of 1 cent a lb. Wire rope was made dutiable at 40 per cent ad valorem, increased from 35 per cent. Woven wire cloth was increased to 40 per cent from 35 per cent and a duty of 50 per cent was placed on Fourdrinier wires and cylinder wires.

The rate on cast iron pipe was increased to 30 per cent from 20 per cent.

In revising the chain paragraph, sprocket and machine chains were eliminated and substitution made by providing for transmission chain with a new duty of 40 per cent on such chain of not more than 2-in. pitch and containing more than three parts per pitch. On all other chains used for transmission of power, the present duty of 35 per cent on sprocket chain was continued.

Upholsterers' nails were added to the nail paragraph and given a duty of 3c. a lb.

Increases, some of them rather sharp, were made in kitchen ware, cutlery, and watches, clocks and jewelry. Cylindrical steel rolls containing more than one-tenth per cent of vanadium or more than two-tenths per cent of tungsten, molybdenum or chromium were made dutiable at 40 per cent.

Alloy cutting tools were incorporated in the paragraph on twist drills, reamers, etc., and the present duty of 60 per cent applied.

A new paragraph provides a duty of 40 per cent on all articles suitable for producing, rectifying, modifying, controlling, or distributing electrical energy and includes numerous items. Among them are all sorts of electrical apparatus, motors, fans, locomotives, portable tools, refrigerators, washing machines, etc.

In the machinery paragraph, reciprocating steam engines, instead of steam engines, are provided for along with steam locomotives, the duty remaining at 15 per cent. Steam turbines are added and given a duty of 30 per cent. The machine tool rate is continued at 30 per cent. In supplementing the machinery paragraph, apparatus for the generation of acetylene gas from calcium carbide is made dutiable at 20 per cent; machines for cutting or hobbing gears, 40 per cent; punches, shears and bar cutters, intended for use in fabricating structural or other rolled iron or steel shapes 40 per cent and parts of all machinery provided for wholly or in chief value of metal are made dutiable at the same rate as the articles of which they are parts. Another new paragraph provides a duty of 50 per cent on breast drills, reamers, taps, dies, etc., and hand tools not otherwise provided for.

Tariff Commission Proposed

Important changes were made in administrative sections. The Tariff Commission personnel, if the provisions are finally enacted into law, would be increased to seven members instead of six as at present and terms of office would be seven instead of twelve years and the salary increased to $12,000 from $7,500. The provisions of existing law relating to political affiliation of commissioners have been eliminated and the President is given authority to select members without regard to their political affiliation.

The flexible provision was rewritten, the bill substituting as the principal to which the President must conform the equalization of "conditions of competition in the principal market or markets of the United States between domestic articles and like or similar competitive imported articles." It is the belief that this standard will permit more speedy adjustments of rates, that conditions will always be ascertainable and that the resulting changes in rates will conform more nearly to the acknowledged policy of Congress. Investigations abroad would be done away with.

(*Concluded on page* 1322)

Schedule of the next instalments of the ***Business Analysis and Forecast****, by Dr. Lewis H. Haney, Director, New York University Bureau of Business Research follows:* ***May 16****—Position of Iron and Steel Producers;* ***May 30****—Activity in Steel Consuming Industries.*

Largest April Iron Output on Record

Actual Data Show Daily Rate Gained 2265 Tons or 1.9 Per Cent Over March —Net Gain of 3 Furnaces

ACTUAL data from all operating furnaces show THE IRON AGE estimate for April, made on April 30, to have been substantially correct. The actual production last month was 122,087 gross tons per day as compared with an estimated daily rate of 121,900 tons, published last week.

Total April pig iron output was 3,662,625 tons or 122,087 tons per day for the 30 days in April, as compared with 3,714,473 tons or 119,822 tons per day for the 31 days in March. This is a gain for April of 2265 tons in the daily rate, or 1.9 per cent. This is the largest April production on record, approached by April, 1923, at 3,549,736 tons, itself a record month up to that time. The April daily rate this year is the third largest ever recorded, exceeded only by June, 1923, at 122,548 tons and by May, 1923, at 124,764 tons.

For the first four months of this year the total output of 14,025,653 tons establishes a new record for that period. The nearest to this was 13,407,684 tons for the same four months in 1925. The largest output for any four months was 14,772,209 tons for April to July, inclusive, in 1923.

Operating Rate Active on May 1

There were 215 furnaces operating on May 1 having an estimated daily operating rate of 122,980 tons. This contrasts with 120,740 tons per day for the 212 furnaces active on April 1. In April, nine furnaces blew in and six were shut down, a net increase of three.

The Steel Corporation blew in seven stacks but blew out none. Independent steel companies blew in two

Daily Average Production of Coke Pig Iron in the United States by Months Since Jan. 1, 1925—Gross Tons

	1925	1926	1927	1928	1929
Jan.	108,720	106,974	100,123	92,573	111,044
Feb.	114,791	104,408	105,024	100,004	114,507
Mar.	114,975	111,032	112,366	103,215	119,822
Apr.	108,632	115,004	114,074	106,183	122,087
May	94,542	112,304	109,385	105,931	.....
June	89,115	107,844	102,988	102,733	.....
½ year	105,039	109,660	107,351	101,763	.....
July	85,936	103,978	95,199	99,091	.....
Aug.	87,241	103,241	95,073	101,180	.....
Sept.	90,873	104,543	92,498	102,077	.....
Oct.	97,528	107,553	89,810	108,832	.....
Nov.	100,767	107,890	88,279	110,084	.....
Dec.	104,853	99,712	86,960	108,705	.....
Year	99,735	107,043	99,266	103,382	.....

Pig Iron Production by Districts, Gross Tons

	April (30 days)	March (31 days)	February (28 days)	January (31 days)
New York and Mass.	257,299	259,771	219,940	231,511
Lehigh Valley	93,506	96,978	85,686	94,285
Schuylkill Valley	69,684	71,002	55,843	51,532
Lower Susq. and Lebanon Valleys	31,150	34,490	31,403	33,576
Pittsburgh district	780,896	779,013	655,405	717,088
Shenango Valley	143,260	134,854	115,619	112,709
Western Pennsylvania	152,942	153,483	135,767	148,098
Maryland, Va. and Ky.	118,785	110,748	87,889	98,366
Wheeling district	142,470	146,546	129,082	145,943
Mahoning Valley	364,373	372,329	331,653	346,603
Central and North'n Ohio	318,678	326,677	303,770	338,616
Southern Ohio	44,139	47,600	40,351	48,110
Illinois and Indiana	768,307	790,784	666,236	674,037
Mich., Minn., Mo., Wis., Colo. and Utah	135,191	134,987	130,649	143,873
Alabama	235,787	249,079	211,061	252,468
Tennessee	6,158	6,132	5,831	5,555
Total	3,662,625	3,714,473	3,206,185	3,442,370

Daily Rate of Pig Iron Production by Months—Gross Tons

	Steel Works Iron	Merchant Iron*	Total
April, 1928	85,183	21,000	106,183
May	85,576	20,355	105,931
June	81,630	21,103	102,733
July	79,513	19,578	99,091
August	82,642	18,538	101,180
September	82,590	19,487	102,077
October	88,051	20,781	108,832
November	88,474	21,610	110,084
December	85,415	23,290	108,705
January, 1929	85,530	25,514	111,044
February	89,246	25,261	114,507
March	95,461	24,361	119,822
April	95,680	26,407	122,087

*Includes pig iron made for the market by steel companies.

Coke Furnaces in Blast

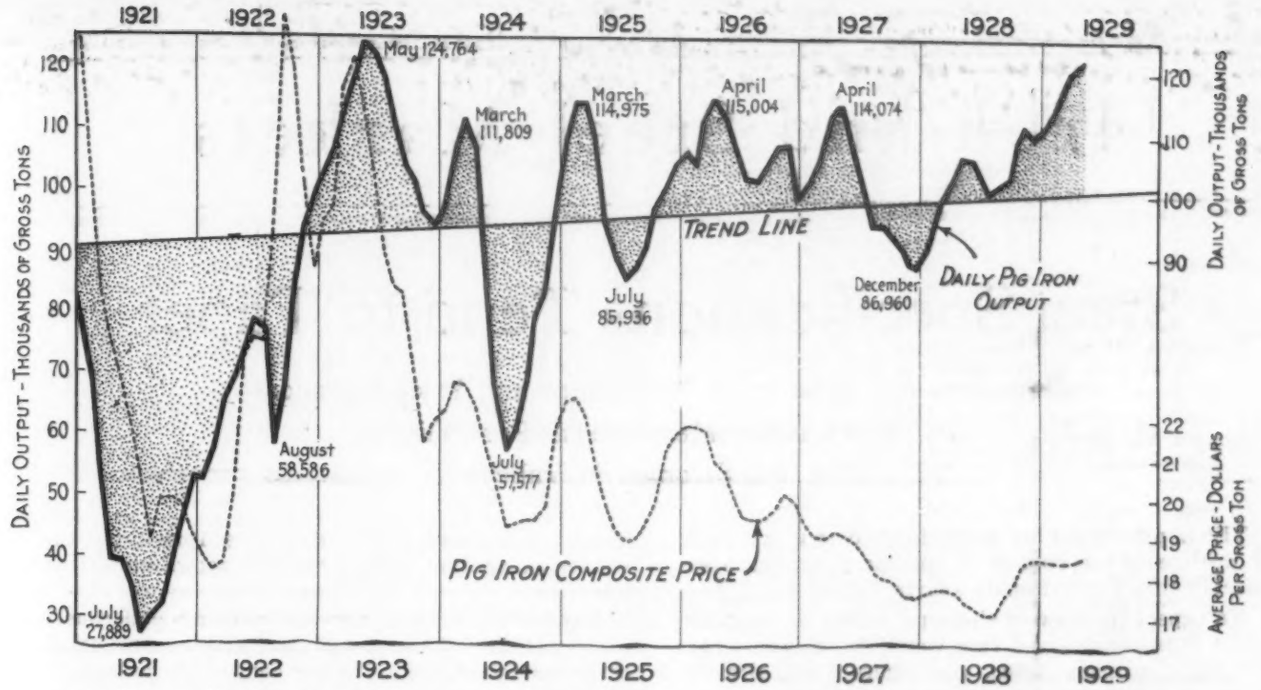
Furnaces	May 1 Number in Blast	May 1 Gross Tons per Day	April 1 Number in Blast	April 1 Gross Tons per Day
New York:				
Buffalo	14	7,490	14	7,400
Other N. Y. and Mass.	3	1,085	3	1,080
New Jersey	0	....	0	....
Pennsylvania:				
Lehigh Valley	8	3,615*	7	3,125*
Schuylkill Valley	5	2,320	5	2,290
Susquehanna Valley	2	1,040	2	1,110
Ferromanganese	0	....	0	....
Lebanon Valley	0	....	0	....
Ferromanganese	0	....	0	....
Pittsburgh District	40	26,500	38	25,065
Ferromanganese and Spiegeleisen	3	625*	3	555*
Shenango Valley	9	4,940	8	4,350
Western Pennsylvania	9	4,700	9	4,925
Ferromanganese	2	420	2	290
Maryland	6	3,495	6	3,110
Wheeling District	8	4,750	8	4,725
Ohio:				
Mahoning Valley	19	11,340	21	12,525
Central and Northern	19	11,390	17	10,310
Southern	3	1,470	3	1,535
Illinois and Indiana	36	25,610	36	25,510
Mich., Wis. and Minn.	6	2,965	6	2,715
Colo., Mo. and Utah	3	1,275	4	2,040
The South:				
Virginia	0	....	0	....
Ferromanganese and Spiegeleisen	1	110*	1	105*
Kentucky	1	....	1	350
Alabama	17	7,635	17	7,430
Ferromanganese	0	....	0	....
Tennessee	1	205	1	195
Total	215	122,980	212	120,740

*Includes spiegeleisen.

Production of Coke Pig Iron in United States by Months Beginning Jan. 1, 1927—Gross Tons

	1927	1928	1929
Jan.	3,103,890	2,869,761	3,442,370
Feb.	2,940,679	2,900,126	3,206,185
Mar.	3,483,362	3,199,674	3,714,473
Apr.	3,422,226	3,185,504	3,662,625
4 mos.	12,910,087	12,155,065	14,025,653
May	3,390,940	3,283,856	.....
June	3,089,651	3,082,000	.....
½ year	19,430,678	18,520,921	.....
July	2,951,160	3,071,824	.....
Aug.	2,947,276	3,136,570	.....
Sept.	2,774,949	3,062,314	.....
Oct.	2,784,112	3,373,806	.....
Nov.	2,648,376	3,302,523	.....
Dec.	2,695,755	3,369,846	.....
Year*	36,232,306	37,837,804	.....

*These totals do not include charcoal pig iron. The 1928 production of this iron was 142,960 gross tons.



The High Production of Pig Iron in April Represented an Average Output per Furnace of About 570 Tons

Inclined line represents the gradually increasing theoretical needs of the country, ascertained by a balancing of the ups and downs in production. It shows an average yearly increase in consumption of about 423,000 tons

stacks and shut down five. Only one merchant furnace was blown out, none being blown in. Thus there was a net gain of three steel-making furnaces for the month.

Both Steel-Making and Merchant Iron Gain

Steel-making output in April at 95,680 tons per day was a gain of only 219 tons per day over the 95,461 tons per day in March. The increase in merchant iron in April was 2046 tons per day, the daily output having been 26,407 tons, against 24,361 tons in March.

Manganese Alloys in April

Spiegeleisen at 21,993 tons in April was a record for some months —made by three companies. The ferromanganese production at 22,413 tons was the smallest this year.

Furnaces Blown In and Out

Among the furnaces blown in during April were the following: "A" furnace at the Bethlehem plant of the Bethlehem Steel Corporation in eastern Pennsylvania; one Carrie, one Edgar Thomson and one Isabella furnace of the Carnegie Steel Co. in the Pittsburgh district; "E" furnace at the Cambria plant of the Bethlehem Steel Corporation in eastern Pennsylvania; one Newcastle furnace of the Carnegie Steel Co. in the Shenango Valley; two furnaces of the National Tube Co. in northern Ohio and one Ensley furnace of the Tennessee Coal, Iron & Railroad Co. in Alabama.

The following furnaces were shut down during April: One furnace of the Pittsburgh Steel Co. in the Pittsburgh district; "K" furnace at the Cambria plant of the Bethlehem Steel Corporation in western Pennsylvania; the Cherry Valley furnace and "A" furnace of the Youngstown Sheet & Tube Co. in the Mahoning Valley; one furnace of the Colorado Fuel & Iron Co. in Colorado and No. 4 furnace of the Sloss-Sheffield Steel & Iron Co. in Alabama.

Production of Steel Companies for Own Use—Gross Tons

	Total Pig Iron Spiegel and Ferromanganese			Ferromanganese*		
	1927	1928	1929	1927	1928	1929
Jan.	2,343,881	2,155,133	2,651,416	31,844	22,298	28,208
Feb.	2,256,651	2,274,880	2,498,901	24,560	19,320	25,978
Mar.	2,675,417	2,588,158	2,959,295	27,834	27,912	24,978
Apr.	2,637,919	2,555,500	2,826,028	24,735	18,405	22,413
4 mos.	9,913,868	9,573,671	10,935,640	108,973	87,935	101,577
May	2,619,078	2,652,872	.....	28,734	29,940	.....
June	2,343,409	2,448,905	.....	29,232	32,088	.....
½ year	14,876,355	14,675,448	.....	166,939	149,963	.....
July	2,163,101	2,464,896	.....	26,394	32,909	.....
Aug.	2,213,815	2,561,904	.....	21,279	24,583	.....
Sept.	2,090,200	2,477,695	.....	20,675	22,278	.....
Oct.	2,076,722	2,729,589	.....	17,710	23,939	.....
Nov.	1,938,043	2,654,211	.....	17,851	29,773	.....
Dec.	1,987,652	2,647,863	.....	20,992	28,618	.....
Year	27,345,888	30,211,606	.....	291,840	312,061	.....

*Includes output of merchant furnaces.

Acquires Patents for Blast Furnace Linings

Inland-Stuart Linings, Inc., has been incorporated in Delaware as a holding company for patents and applications for patents covering blast furnace linings formerly owned by the Inland Steel Co., the Harbison-Walker Refractories Co. and Brooke L. Jarrett & Co., the latter of Pittsburgh. The Inland-Stuart method, it is stated, provides a blast furnace lining with all brick joints broken both horizontally and vertically. Inland-Stuart Linings, Inc., will have its offices in the Koppers Building, Pittsburgh.

Net earnings of the Ohio Seamless Tube Co., Shelby, Ohio, for the first quarter were double the earnings for the same period last year, amounting to $232,686, compared with $115,934 for the same period a year ago. The increase is attributed to a considerable extent to the demands from the aviation industry.

Iron and Steel Markets

Steel Specifications Tend to Taper

Shipments and Production Maintained and Price Advances for Third Quarter Mentioned as Possibility— Pig Iron Stronger in Valleys

STEEL production is undiminished, but a slight decline in the volume of specifications has been reflected in a proportionate shortening of deliveries.

To expect the flow of shipping orders to be maintained at an unchanged rate would be to ignore the fact that, in some cases, consumers have already specified fully against contracts for the current quarter. Mill books for the third quarter have not yet been opened, except for contracts subject to prices ruling at time of delivery, and buyers, as a rule, have not yet entered the market for that period.

No definite announcement regarding third quarter quotations has been made by producers, but advances in sheets, bars, plates and shapes are freely mentioned as possibilities. Such a move, coupled with any uncertainty among consumers regarding money market influences, might retard contracting, it is held, with resulting further reduction in mill backlogs. Lulls between buying movements, though hardly distinguishable of late, have been familiar market developments, but they throw little light on the rate of steel consumption.

Meanwhile, shipments continue at a virtually unaltered pace, and ingot output shows few variations except those dictated by mechanical limitations. Production of mill products is still restricted by the scarcity of crude steel, sheet mill operations being most affected on that account. The leading sheet maker is now running at 88 per cent of capacity and independents are on a slightly higher basis. Tin plate output, on the other hand, is at 100 per cent.

Complete figures for April show an increase in the rate of pig iron output that verifies the estimate made by THE IRON AGE on the closing day of the month. The daily average, in fact, was 187 tons higher than that given a week ago. At 122,087 tons, it made a gain of 2265 tons, or 1.9 per cent over the daily rate for March. The month's total, as revised, was 3,662,625 tons, compared with 3,714,473 tons for the 31 days in March.

The 215 furnaces in blast on May 1 were producing at a rate of nearly 44,900,000 tons per annum, exceeded only twice, in 1923.

Variations in the production of different makes of automobiles, although as yet resulting in little change in total output, have been reflected in similar divergences in the position of mills. Makers of low-priced cars are taking steel at an unchanged rate, but a few other car builders have curtailed operations preparatory to introducing new models. The unfilled tonnage of a leading independent sheet maker has declined 10 per cent since April 1, but the backlog of another large producer shows almost no reduction.

Expanding exports are contributing generously to the activity of the motor car industry and other steel-consuming lines. Ten per cent of the passenger automobiles and 35 per cent of the motor trucks manufactured in March were for shipment to other countries. Machinery exports in March, valued at $59,508,000, established a new monthly record, exceeding the previous peak total of January, 1921, by $2,802,000.

Unrelaxed pressure of demand in the Chicago district has raised the question whether consumers have pyramided orders to insure required deliveries. Sales in that area were well in excess of shipments, and specifications were the largest in five weeks. Bars, plates and shapes are strengthening in price, with orders more commonly bringing 2.10c. to 2.15c. a lb., compared with a recent minimum of 2.05c. Buyers continue to turn to outside mills for supplies, and a Lake Erie producer has arranged a schedule calling for the delivery of two cargoes at Chicago every week.

In the East, shipbuilders will need sizable tonnages of plates and shapes for merchant vessels recently contracted for, and have entered bids on scout cruisers to be placed by the Navy Department.

Fully 100,000 tons of steel will be required for a pipe line to be laid for the Southern Natural Gas Co. from Monroe, La., to Atlanta, Ga. The general contract has been placed with Ford, Bacon & Davis, Inc., New York.

Pig iron is stronger in the Valleys, where various grades have advanced 50c. a ton. Demand is light in most markets, pending the inauguration of third quarter buying. Shipments, however, are at an undiminished rate. May specifications from foundries affiliated with the automotive industry indicate that they will take as much iron as during any previous month this year. The third cargo of Lake Erie pig iron has been unloaded at Chicago and others are to follow soon. A ship-load of English hematite is expected to dock there next week.

Scrap prices still have a weak tone. Heavy melting grade has declined 25c. a ton at Chicago, but has shown no further change at Pittsburgh.

THE IRON AGE composite price for pig iron has advanced from $18.58 to $18.67 a ton, a new high for this year and 8c. a ton above the peak for 1928. The finished steel composite remains at 2.412c. a lb.

A Comparison of Prices

Market Prices at Date, and One Week, One Month and One Year Previous, Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron, Per Gross Ton:	May. 7, 1929	Apr. 30, 1929	Apr. 9, 1929	May 8, 1928
No. 2 foundry, Philadelphia	$21.76	$21.76	$21.76	$20.76
No. 2, Valley furnace	**18.50**	18.00	18.00	17.25
No. 2 Southern, Cin'ti	18.69	18.69	19.19	19.19
No. 2, Birmingham	15.00	15.00	15.50	15.50
No. 2 foundry, Chicago*	20.00	20.00	20.00	18.50
Basic, del'd eastern Pa.	20.25	20.25	20.25	19.00
Basic, Valley furnace	18.00	18.00	18.00	16.50
Valley Bessemer, del'd P'gh	**20.76**	20.26	20.26	19.26
Malleable, Chicago*	20.00	20.00	20.00	18.50
Malleable, Valley	**19.00**	18.50	18.50	17.25
Gray forge, Pittsburgh	19.26	19.26	19.26	18.51
L. S. Charcoal, Chicago	27.04	27.04	27.04	27.04
Ferromanganese, furnace	105.00	105.00	105.00	100.00
Rails, Billets, Etc., Per Gross Ton:				
Rails, heavy, at mill	$43.00	$43.00	$43.00	$43.00
Light rails at mill	36.00	36.00	36.00	36.00
Rerolling billets, Pittsburgh	36.00	36.00	34.00	33.00
Sheet bars, Pittsburgh	36.00	36.00	35.00	34.00
Slabs, Pittsburgh	36.00	36.00	34.00	33.00
Forging billets, Pittsburgh	41.00	41.00	39.00	38.00
Wire rods, Pittsburgh	42.00	42.00	42.00	44.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	1.85	1.85	1.85	1.85
Finished Steel,				
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Bars, Pittsburgh	1.95	1.95	1.95	1.85
Bars, Chicago	2.05	2.05	2.05	2.00
Bars, Cleveland	1.95	1.95	1.95	1.85
Bars, New York	2.29	2.29	2.29	2.19
Tank plates, Pittsburgh	1.95	1.95	1.95	1.85
Tank plates, Chicago	2.05	2.05	2.05	2.00
Tank plates, New York	2.22½	2.22½	2.22½	2.17½
Structural shapes, Pittsburgh	1.95	1.95	1.95	1.85
Structural shapes, Chicago	2.05	2.05	2.05	2.00
Structural shapes, New York	2.19½	2.19½	2.19½	2.14½
Cold-finished bars, Pittsburgh	2.30	2.30	2.30	2.20
Hot-rolled strips, Pittsburgh	1.90	1.90	1.90	2.05
Cold-rolled strips, Pittsburgh	2.75	2.75	2.75	3.00

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

Finished Steel,	May. 7, 1929	Apr. 30, 1929	Apr. 9, 1929	May 8, 1928
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 24, P'gh	2.85	2.85	2.85	2.70
Sheets, black, No. 24, Chicago dist. mill	3.05	3.05	3.05	2.85
Sheets, galv., No. 24, P'gh	3.60	3.60	3.60	3.60
Sheets, galv., No. 24, Chicago dist. mill	3.80	3.80	3.80	3.70
Sheets, blue, 9 and 10, P'gh	2.10	2.10	2.10	2.00
Sheets, blue, 9 and 10, Chicago dist. mill	2.30	2.30	2.30	2.15
Wire nails, Pittsburgh	2.65	2.65	2.65	2.55
Wire nails, Chicago dist. mill	2.70	2.70	2.70	2.70
Plain wire, Pittsburgh	2.50	2.50	2.50	2.50
Plain wire, Chicago dist. mill	2.55	2.55	2.55	2.55
Barbed wire, galv., P'gh	3.30	3.30	3.30	3.35
Barbed wire, galv., Chicago dist. mill	3.35	3.35	3.35	3.40
Tin plate, 100 lb. box, P'gh	$5.35	$5.35	$5.35	$5.25
Old Material, Per Gross Ton:				
Heavy melting steel, P'gh	$18.25	$18.25	$18.75	$15.50
Heavy melting steel, Phila	*16.50*	17.00	17.00	13.50
Heavy melting steel, Ch'go	*15.50*	15.75	16.00	13.00
Carwheels, Chicago	14.50	14.50	14.50	13.50
Carwheels, Philadelphia	16.50	16.50	16.50	15.50
No. 1 cast, Pittsburgh	15.00	15.00	15.50	14.50
No. 1 cast, Philadelphia	16.50	16.50	16.50	16.00
No. 1 cast, Ch'go (net ton)	*15.50*	16.00	16.00	14.00
No. 1 RR., Phila	16.00	16.00	16.00	15.00
No. 1 RR. wrot., Ch'go (net)	14.00	14.00	14.00	11.50
Coke, Connellsville, Per Net Ton at Oven:				
Furnace coke, prompt	$2.75	$2.75	$2.80	$2.60
Foundry coke, prompt	3.75	3.75	3.75	3.75
Metals,				
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York	18.12½	18.12½	22.00	14.25
Electrolytic copper, refinery	17.75	17.75	21.75	14.00
Tin (Straits), New York	*44.00*	44.12½	46.62½	51.37½
Zinc, East St. Louis	6.60	6.60	6.80	5.95
Zinc, New York	6.95	6.95	7.15	6.30
Lead, St. Louis	6.80	6.80	7.10	6.00
Lead, New York	7.00	7.00	7.25	6.10
Antimony (Asiatic), N. Y.	*9.25*	9.37½	9.50	11.25

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

Pittsburgh

Consumer Stocks Low in Face of Unprecedented Demand But Better Deliveries in Some Products

PITTSBURGH, May 7.—While steel production remains generally unchanged, diminishing specifications on some products are interpreted in certain quarters to indicate a slackening in the consumption of steel. This tendency is not reflected in shipments, which were at a record pace in April and are being continued in uninterrupted volume this month. But, particularly in cold-finished steel bars and hot-rolled strip, the high rate of production and shipments has begun to eat into mill backlogs and the pressure for shipments is disappearing. As a result mills are now able to make deliveries of cold-finished steel bars in an average of three weeks as compared to five weeks about a month ago and hot-rolled strip is obtainable a week or two more quickly than was possible early in April. On both these products, however, production will continue at the present rate until June and new business now being written promises excellent operations until the end of the quarter.

Of particular interest at this time is to know whether or not the heavy movement of steel is going directly into consumption. The heavy demand during March and April was largely seasonal, but its continuance into May is unprecedented and either indicates a significant increase in the country's consuming power or a tendency on the part of buyers to overestimate their needs. A careful canvass of the market by certain large companies indicates that thus far steel has been moving into consumption in a healthy way and that consumers' stocks are reasonably low. The continued heavy demand, while partly traceable to the large requirements of the automotive industry, cannot be explained so easily and producers are trying to guard against an oversold market.

Makers of automobiles in the low-priced range are still taking steel at the recent high rate, but a few companies have curtailed production preparatory to the introduction of new models. In some cases they have placed orders for large tonnages of sheets and strips for June and late delivery in anticipation of the requirements of these cars. This does not confirm reports of expected sharp declines in the requirements of Michigan companies in the early summer.

The lack of proper supplies of semi-finished steel cut down the rate of operation of at least one sheet mill in this district last week. In other cases non-integrated companies have been forced to decline orders for sheets for delivery this quarter because their allotments of sheet bars would not be sufficient, and a canvass of the market made recently did not reveal any semi-finished steel for sale before July 1. In view of this, there is talk of an advance in sheet bars for third quarter. Sheet prices may also be advanced, but mills have not yet opened their books for third-quarter contracts. Present maximum prices are better established and mills with large backlogs are regularly refusing business offered at lower quo-

tations. The present price on tin plate will probably be continued in the second half.

Pig-iron prices are generally stronger and basic has been advanced 50c. to $18.50, Valley, on the basis of a sale of 20,000 tons to a consumer in that district. The foundry grade is also quotable at $18.50 and no instances of sales of malleable or Bessemer at less than $19 are reported.

Scrap is not noticeably weaker, and although declines of 25c. and 50c. a ton have been registered in some grades, there have been no sales of heavy melting steel at less than $18.

Pig Iron.—The market is somewhat stronger, and with the exception of a reported sale of 20,000 tons of basic in the Valley, at $18.50, is still rather quiet. The last large transaction in basic, the purchase of 5000 tons by an Alliance, Ohio, consumer, did not bring more than $18. The more recent purchase was not made in the open market with all producers bidding, and the trade is not disposed to regard it as representative of the true strength of the market. Sales of Bessemer and malleable at $19, Valley, have not been uncommon in the last week and involved some lots of 500 and 1000 tons. Although transactions in foundry iron have been confined largely to smaller tonnages, the aggregate has been fairly large and the No. 2 grade seems to be well established at $18.50. Consumers are specifying freely against their second-quarter contracts and some of them will be forced to enter the market this month or early in June to supplement their original requirements. Furnace stocks of the merchant producers are abnormally low and some interests are entirely sold up for the remainder of the quarter. The Cherry Valley stack of the Davison Coke & Iron Co. has been blown out for relining.

Prices per gross ton, f.o.b. Valley furnace:

Basic	$18.00 to $18.50
Bessemer	18.50 to 19.00
Gray forge	17.50 to 18.00
No. 2 foundry	18.50
No. 3 foundry	17.50 to 18.00
Malleable	19.00
Low phos., copper free	26.50 to 27.00

Freight rate to Pittsburgh or Cleveland district, $1.76.

Semi-Finished Steel.—A careful survey of steel mills in this and near-

Warehouse Prices, f.o.b. Pittsburgh

	Base per Lb.
Plates	3.00c.
Structural shapes	3.00c.
Soft steel bars and small shapes	2.90c.
Reinforcing steel bars	2.75c.
Cold-finished and screw stock—	
Rounds and hexagons	3.60c.
Squares and flats	4.10c.
Bands	3.25c.
Hoops	4.25c.
Black sheets (No. 24), 25 or more bundles	3.80c.
Galv. sheets (No. 24), 25 or more bundles	4.55c.
Blue ann'l'd sheets (No. 10), 1 to 10 sheets	3.45c.
Galv. corrug. sheets (No. 28), per square	$4.43
Spikes, large	3.40c.
Small	3.80c. to 5.25c.
Boat	3.80c.
Track bolts, all sizes, per 100 count,	60 per cent off list
Machine bolts, 100 count,	60 per cent off list
Carriage bolts, 100 count,	60 per cent off list
Nuts, all styles, 100 count,	60 per cent off list
Large rivets, base per 100 lb.	$3.50
Wire, black soft ann'l'd, base per 100 lb.	$3.00 to 3.10
Wire, galv. soft, base per 100 lb.	3.00 to 3.10
Common wire nails, per keg	3.00
Cement coated nails, per keg	3.05

by districts made by a non-integrated mill during the last week indicated that there is no semi-finished steel for sale during the remainder of the quarter. Purchases of ingots by at least three companies in the last two weeks have also exhausted the supply of steel in that form. Mills receiving their crude steel under contract are receiving just enough to supply their minimum requirements, but are asking for additional tonnage which makers are unable to supply. The leading maker of sheets was forced to curtail its production slightly during the last week on account of an insufficient supply of the proper kind of sheet bars. One or two other cases of finishing mill operations having been decreased for the same reason have been reported. Otherwise the supply of semi-finished steel is just keeping pace with finished steel production in this district. The quotation of $36, Pittsburgh or Youngstown, is untested, but fully representative of the market. In view of present operating conditions in the industry, it is now considered likely that this price will apply on third quarter business.

Bars, Shapes and Plates.—Demand for the heavy hot-rolled products continues to keep pace with output. New business is gratifying and specifications are coming in steadily, with plates probably the most active. Although a part of this activity in plates is undoubtedly due to the requirements of railroad car builders and makers of barges, mills report a very satisfactory flow of orders from diversified consuming lines. It has also been pointed out that, while about 75 per cent of the cars placed so far this year have gone to the Chicago district, a large part of the orders now pending will likely come to Pittsburgh shops. This district will also share in the requirements of relatively heavy building programs in the Altoona and Juniata, Pa., shops of the Pennsylvania Railroad. Structural awards have shown some improvement recently. New inquiries are increasing and the volume of pending business is good for this time of the year. This condition also holds true in reinforcing bars, and jobs being placed in this district are requiring a considerable tonnage. Because mills have had unusually heavy operating schedules on merchant bars, the rollings of reinforcing bars have been cut down and in some cases deliveries have been extended for several weeks. On reinforcing bars, mills are quoting 2.05c., Pittsburgh, for the 40, 50 and 60-ft. lengths and 2.30c. for the cut lengths out of warehouse. On merchant bars and plates and shapes the 1.95c., Pittsburgh, price applies on the general run of new business, with occasional concessions.

Rails and Track Supplies.—Specifications on spikes and tie plates are coming in steadily and are sufficient to maintain mill operations at about the present rate. Backlogs have been reduced slightly in the last two or three weeks and new business continues to taper slightly.

Bolts, Nuts and Rivets.—Demand for bolts, nuts and rivets was better during April and March than at any time since 1920, and producers were able to operate at 70 to 75 per cent of capacity. This is fully 20 per cent above what was formerly considered a normal rate, and at present there are no indications of a falling off. A

The Iron Age Composite Prices

Finished Steel

May 7, 1929, 2.412c. a Lb.

One week ago	2.412c.
One month ago	2.412c.
One year ago	2.348c.
10-year pre-war average	1.689c.

Based on steel bars, beams, tank plates, wire, nails, black pipe and black sheets. These products make 87 per cent of the United States output of finished steel.

	High		Low	
1929	2.412c.,	April 2;	2.391c.,	Jan. 8
1928	2.391c.,	Dec. 11;	2.314c.,	Jan. 3
1927	2.453c.,	Jan. 4;	2.293c.,	Oct. 25
1926	2.453c.,	Jan. 5;	2.403c.,	May 18
1925	2.560c.,	Jan. 6;	2.396c.,	Aug. 18

Pig Iron

May 7, 1929, $18.67 a Gross Ton

One week ago	$18.58
One month ago	18.54
One year ago	17.50
10-year pre-war average	15.72

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

	High		Low	
1929	$18.67,	May 7;	$18.29,	March 19
1928	18.59,	Nov. 27;	17.04,	July 24
1927	19.71,	Jan. 4;	17.54,	Nov. 1
1926	21.54,	Jan. 5;	19.46,	July 13
1925	22.50,	Jan. 13;	18.96,	July 7

Mill Prices of Finished Iron and Steel Products

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh mill	1.95c.
F.o.b. Chicago	2.05c. to 2.15c.
Del'd Philadelphia	2.27c.
Del'd New York	2.29c.
Del'd Cleveland	1.95c. to 2.00c.
F.o.b. Cleveland	1.95c. to 2.00c.
F.o.b. Lackawanna	2.05c.
F.o.b. Birmingham	2.15c.
C.i.f. Pacific ports	2.35c.
F.o.b. San Francisco mills	2.35c. to 2.40c.

Billet Steel Reinforcing

F.o.b. Pittsburgh mills, 40, 50, 60-ft.	2.05c.
F.o.b. Pittsburgh mills, cut lengths	2.30c.
F.o.b. Birmingham, mill lengths	2.15c.

Rail Steel

F.o.b. mills, east of Chicago dist.	1.85c.
F.o.b. Chicago Heights mill	1.95c.
Del'd Philadelphia	2.27c.

Iron

Common iron, f.o.b. Chicago	2.05c. to 2.10c.
Refined iron, f.o.b. P'gh mills	2.75c.
Common iron, del'd Philadelphia	2.12c.
Common iron, del'd New York	2.14c.

Tank Plates

	Base per Lb.
F.o.b. Pittsburgh mill	1.95c.
F.o.b. Chicago	2.05c.
F.o.b. Birmingham	2.15c.
Del'd Cleveland	2.14c.
Del'd Philadelphia	2.15c.
F.o.b. Coatesville	2.05c.
F.o.b. Sparrow Point	2.05c.
F.o.b. Lackawanna	2.05c.
Del'd New York	2.22½c.
C.i.f. Pacific ports	2.20c. to 2.30c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh mill	1.95c.
F.o.b. Chicago	2.05c. to 2.15c.
F.o.b. Birmingham	2.15c.
F.o.b. Lackawanna	2.05c.
F.o.b. Bethlehem	2.05c.
Del'd Cleveland	2.14c.
Del'd Philadelphia	2.01c. to 2.06c.
Del'd New York	2.14½c.
C.i.f. Pacific ports	2.35c.

Hot-Rolled Hoops, Bands and Strips

	Base per Lb.
6 in. and narrower, P'gh	2.00c.
Wider than 6 in., P'gh	1.90c.
6 in. and narrower, Chicago	2.20c.
Wider than 6 in., Chicago	2.10c.
Cooperage stock, P'gh	2.20c.
Cooperage stock, Chicago	2.30c.

Cold-Finished Steel

	Base per Lb.
Bars, f.o.b. Pittsburgh mill	2.30c.
Bars, f.o.b. Chicago	2.30c.
Bars, Cleveland	2.35c.
Shafting, ground, f.o.b. mill	*2.65c. to 3.60c.
Strips, P'gh	2.75c. to 2.85c.
Strips, Cleveland	2.75c. to 2.85c.
Strips, del'd Chicago	3.05c. to 3.15c.
Strips, Worcester	2.90c. to 3.00c.
Fender stock, No. 20 gage, Pittsburgh or Cleveland	4.25c. to 4.35c.

*According to size.

Wire Products

(Carload lots, f.o.b. Pittsburgh and Cleveland, to jobbers and retailers.)

	Base per Keg
Wire nails	$2.65 to $2.75
Galvanized nails	4.65 to 4.75
Galvanized staples	3.35 to 3.45
Polished staples	3.10 to 3.20
Cement coated nails	2.65 to 2.75

	Base per 100 Lb.
Bright plain wire, No. 6 to No. 9 gage	$2.50 to $2.60
Annealed fence wire	2.65 to 2.75
Spring wire	3.50 to 3.60
Galv'd wire, No. 9	3.10 to 3.20
Barbed wire, galv'd	3.30 to 3.40
Barbed wire, painted	3.05 to 3.15
Woven wire fence (per net ton to retailers)	65.00

Chicago district mill and delivered Chicago prices are $1 per ton above the foregoing. Birmingham mill prices $3 a ton higher; Worcester, Mass., (wire) mill $3 a ton higher on production of that plant; Duluth, Minn., mill $2 a ton higher; Anderson, Ind., $1 higher.

Cut Nails

	Per 100 Lb.
Carloads, Wheeling, Reading or Northumberland, Pa.	$2.70
Less carloads, Wheeling or Reading	2.80

Sheets

Blue Annealed

	Base per Lb.
Nos. 9 and 10, f.o.b. P'gh	2.10c. to 2.20c.
Nos. 9 and 10, f.o.b. Chicago dist.	2.30c.
Nos. 9 and 10, del'd Cleveland	2.29c. to 2.39c.
Nos. 9 and 10, del'd Philadelphia	2.42c. to 2.52c.
Nos. 9 and 10, f.o.b. Birmingham	2.25c. to 2.35c.

Box Annealed, One Pass Cold Rolled

No. 24, f.o.b. Pittsburgh	2.85c. to 2.95c.
No. 24, f.o.b. Chicago d'st. mill	3.05c.
No. 24, del'd Cleveland	3.04c. to 3.14c.
No. 24, del'd Philadelphia	3.17c. to 3.27c.
No. 24, f.o.b. Birmingham	3.00c. to 3.10c.

Metal Furniture Sheets

No. 24, f.o.b. P'gh	4.10c. to 4.20c.

Galvanized

No. 24, f.o.b. Pittsburgh	3.60c. to 3.70c.
No. 24, f.o.b. Chicago dist. mill	3.80c.
No. 24, del'd Cleveland	3.79c. to 3.89c.
No. 24, del'd Philadelphia	3.92c. to 4.02c.
No. 24, f.o.b. Birmingham	3.75c. to 3.85c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	3.00c.
No. 28, f.o.b. Chicago dist. mill	3.10c.

Automobile Body Sheets

No. 28, f.o.b. Pittsburgh	4.10c.

Long Ternes

No. 24, 8-lb. coating, f.o.b. mill	4.00c.

Vitreous Enameling Stock

No. 24, f.o.b. Pittsburgh	3.90c.

Tin Plate

	Per Base Box
Standard cokes, f.o.b. P'gh district mills	$5.35
Standard cokes, f.o.b. Gary	5.45

Terne Plate

(F.o.b. Morgantown or Pittsburgh)

(Per Package, 20 x 28 in.)

8-lb. coating I.C.	$11.20
15-lb. coating I.C.	14.00
20-lb. coating I.C.	15.30
25-lb. coating I.C.	$16.70
30-lb. coating I.C.	17.75
40-lb. coating I.C.	19.85

Alloy Steel Bars

(F.o.b. maker's mill)

Alloy Quality Bar Base, 2.65c. to 2.75c. per Lb.

S.A.E. Series Numbers		Alloy Differential
2000	(½% Nickel)	0.25
2100	(1½% Nickel)	0.55
2300	(3½% Nickel)	1.50
2500	(5% Nickel)	2.25
3100	Nickel Chromium	0.55
3200	Nickel Chromium	1.35
3300	Nickel Chromium	3.80
3400	Nickel Chromium	3.20
4100	Chromium Molybdenum (0.15 to 0.25 Molybdenum)	0.50
4100	Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600	Nickel Molybdenum (0.20 to 0.30 Molybdenum, 1.25 to 1.75 Nickel)	1.05
5100	Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100	Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100	Chromium Spring Steel	0.20
6100	Chromium Vanadium Bars	1.20
6100	Chromium Vanadium Spring Steel	0.95
9250	Silicon Manganese Spring Steel (flats)	0.25
	Rounds and squares	0.50
	Chromium Nickel Vanadium	1.50
	Carbon Vanadium	0.95

Above prices are for hot rolled steel bars, forging quality. The ordinary differential for cold-drawn bars is ¾c. per lb. higher. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis. For billets under 4 x 4 down to and including 2½ in. squares, the price is $5 a gross ton above the 4 x 4 billet price.

Slabs with sectional area of 16 in. or over carry the billet price; slabs with sectional area of 12 in. to 16 in. carry a $5 extra above the billet price and slabs with a sectional area under 12 in. carry the bar price.

Band sizes are 40c. per 100 lb. higher.

Rails

	Per Gross Ton
Standard, f.o.b. mill	$43.00
Light (from billets), f.o.b. mill	36.00
Light (from rail steel), f.o.b. mill	34.00
Light (from billets), f.o.b. Ch'go mill	36.00

Track Equipment

	Base per 100 Lb.
Spikes, ⅜ in. and larger	$2.80
Spikes, ⅓ in. and smaller	2.80
Spikes, boat and barge	3.00
Tie plates, steel	2.15
Angle bars	$2.75
Track bolts, to steam railroads	$3.80 to 4.00
Track bolts, to jobbers, all sizes, per 100 count	70 per cent off list

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Butt Weld

Steel Inches	Black	Galv.	Iron Inches	Black	Galv.
⅛	45	19½	¼ and ⅜	+11	+36
¼ to ⅜	51	25½	½	23	5
½	56	42½	¾	28	11
¾	60	48½	1 and 1¼	31	15
1 to 3	62	50½	1½ and 2	35	18

Lap Weld

2	55	43½	2	23	9
2½ to 6	59	47½	2½ to 3½	28	13
7 and 8	56	43½	4 to 6	30	17
9 and 10	54	42½	7 and 8	29	16
11 and 12	53	40½	9 to 12	26	11

Butt Weld, extra strong, plain ends

⅛	41	24½	¼ and ⅜	+13	+48
¼ to ⅜	47	30½	½	23	7
½	53	42½	¾	28	12
¾	58	47⅞	1 to 2	34	18
1 to 1½	60	49½			
2 to 3	61	50½			

Lap Weld, extra strong, plain ends

2	53	42½	2	29	18
2½ to 4	57	46½	2½ to 4	34	20
4½ to 6	56	45½	4½ to 6	33	19
7 to 8	52	39½	7 and 8	31	17
9 and 10	45	32½	9 to 12	21	8
11 and 12	44	31½			

On carloads the above discounts on steel pipe are increased on black by one point, with supplementary discount of 5%, and on galvanized by 1½ points, with supplementary discount of 5%. On iron pipe, both black and galvanized, the above discounts are increased to jobbers by one point with supplementary discounts of 5 and 2½%.

Note.—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Steel		Charcoal Iron	
2 in. and 2¼ in.	40	1½ in.	1
2½ in.—2¾ in.	48	1¾ in.	8
3 in.	54	2 in.—2¼ in.	13
3¼ in.—3¾ in.	56	2½ in.—2¾ in.	16
4 in.	59	3 in.	17
4½ in. to 6 in.	48	3¼ in. to 3½ in.	18
		4 in.	20
		4½ in.	21

On lots of a carload or more, the above base discounts are subject to a preferential of two fives on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts:

Lap Welded Steel—Under 10,000 lb., 6 points under base and one five; 10,000 lb. to carload, 4 points under base and two fives. Charcoal Iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five.

Standard Commercial Seamless Boiler Tubes

Cold Drawn

1 in.	63	3 in.	48
1¼ to 1½ in.	55	3½ to 3½ in.	50
1¾ in.	39	4 in.	53
2 to 2¼ in.	34	4½, 5 and 6 in.	42
2½ to 2¾ in.	42		

Hot Rolled

2 and 2¼ in.	40	3¼ to 3½ in.	56
2½ and 2¾ in.	48	4 in.	59
3 in.	54	4½, 5 and 6 in.	48

Beyond the above base discounts a preferential discount of 5 per cent is allowed on carload lots. On less than carloads to 10,000 lb. base discounts are reduced 4 points with 5 per cent preferential; on less than 10,000 lb., base discounts are reduced 6 points, with no preferential. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gage take mechanical tube list and discounts. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

	Per Cent Off List
Carbon, 0.10% to 0.30%, base (carloads)	55
Carbon, 0.30% to 0.60%, base	50

Plus differentials for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.

part of this activity is attributable to the unusually heavy demand from railroads and car builders, but shipments are well distributed throughout the various consuming lines. Prices for bolts and nuts are well established at 70 per cent off list, and large rivets are firm at $3.10 per 100 lb., Pittsburgh or Cleveland.

Wire Products.—Wire business is now above the average with nearly all makers. Manufacturers' wire is in strongest demand, but there is a heavy movement of fence wire and barbed wire to the agricultural regions, and, with jobbers' stocks reported lower than usual at this time of the year, a large part of it is going directly into consumption. Prices are well adhered to. Any seasonal improvement in the demand for nails is scarcely noticeable, and, while prices are steady locally, concessions are reported regularly in the Southwest.

Tubular Goods.—Oil country demand for tubular goods is still far from satisfactory, but there are reports of increased activity in the fields adjacent to Tulsa, Okla. As large stocks are necessarily carried by distributers in those regions, this improvement in drilling operations is not yet felt by mills. The general contract has been let on the line of the Southern Natural Gas Co., extending from Monroe, La., to Atlanta, Ga., which will require at least 100,000 tons of pipe, and the steel may be placed in the near future. Demand for standard pipe for building operations continues to improve, but it is yet too early to see how much the decline in building work this year as compared to 1928 will affect this business. Shipments of mechanical tubing to the automobile industry are being maintained with little or no interruption, and there is a steady demand for boiler tubes.

Sheets.—Sheet production in this district was curtailed slightly last week on account of the shortage of semi-finished steel. The leading interest operated its mills at about 88 per cent of capacity and operations of the independents were at a slightly higher rate. Delivery promises are not being appreciably shortened, extending from about four weeks for some of the common finishes to as long as three months on automobile body sheets. The average in the various types of sheets runs from six to eight weeks. New business is tapering slightly, but the first week of May brought specifications which are fully up to those of recent weeks. The decline in new business is natural in view of the fact that mills have not yet opened books for third quarter, and in some cases second quarter contracts have been fully specified in order to insure delivery at the proper time. Major rolling schedules have now been virtually arranged until the latter part of June, and mills are not anxious for tonnage, particularly in blue annealed. With the quarter nearly half gone, the price situation is improving. Consumers are more willing to place orders at the generally quoted prices, as mills are now in a position to decline business offered at concessions and feel sure that the tonnage is not likely to be placed elsewhere at a lower figure. In view of present conditions it is also evident that prices will be stronger in the third quarter and occasional talk of advances is heard.

Tin Plate.—Unfavorable weather during the last week or two in nearly all sections of the country has brought about a slight lull in tin plate demand, but there has been nothing to indicate definitely any decrease in the needs of container manufacturers. The early frosts in California may have diminished the fruit pack in that State as much as 33 per cent, but this will be more than offset by the expected increase in the canning of vegetables. The large fish pack on the Pacific Coast is also becoming a factor in the business of the can manufacturers, and this will reflect itself in the tonnage of tin plate required for that region. The leading interest operated its mills last week at 99 per cent of capacity, and, with independent mills running at a somewhat better rate, the industry enters May with plants at about 100 per cent. The second half contract price has not yet been named, but will likely remain at $5.35 per base box.

Cold-Finished Steel Bars.—Operations are still being maintained at the high rate which has prevailed for several weeks, but this has been cutting into backlogs during the last fortnight, and delivery promises now average about three weeks, compared with five and six weeks a month ago. With the decrease in specifications, however, new business has improved somewhat and consumers are beginning to show interest in third quarter contracts. Orders for immediate shipments are not uncommon, and this is considered a very favorable sign in view of the heavy specifications at the old prices received at the end of March. The price is well established at 2.30c., Pittsburgh.

Hot-Rolled Strip.—Mills have adjusted their operating schedules to meet demand more closely and heavy pressure for shipments has largely subsided. On some sizes deliveries can be made in four weeks or less, but on others commitments extend to the end of the quarter. Specifications are still coming in at a good rate, but, on the whole, are no longer equal to shipments. New business includes large forward tonnages from automobile companies which are about to bring out new models and will require less steel for a few weeks while the necessary factory changes are being made. Prices are steady at 1.90c., Pittsburgh or Cleveland, for material wider than 6 in. and 2c. for the narrow widths.

Cold-Rolled Strip.—Makers of cold-rolled strip are now committed until late June, and, while specifications have decreased slightly in the last week or two, backlogs are not being reduced appreciably. There is still considerable pressure for delivery from some consuming lines. On fender stock shipments cannot be made for six or eight weeks. Makers of automobiles in the low-priced field are taking this material at an unchanged rate, and, if the first week of the month may be taken as a criterion, May will not fall far behind April in shipments. Prices are unchanged at 2.75c. to 2.85c., Pittsburgh.

Coke and Coal.—Heavier requirements from the steel industry have not improved the demand for furnace coke and the market is still sluggish, with prices ranging from $2.75 to $2.85, Connellsville. Lower figures are heard occasionally, but these are not representative of the general market. The leading interest has put on additional ovens in the Connellsville district, but this has been done largely to offset a loss at Clairton, Pa., where a number of units are down for repairs. Foundry coke is moving into consumption steadily.

Old Material.—The market has shown no further weakness during the last week and a few sales of heavy melting steel have been made at $18 and $18.25. One consumer is said to have paid $18.50 for a smaller tonnage but the $18 figure is probably more representative of the market. The supply of scrap in the district is still very plentiful and a number of mills are still well covered for several weeks. For this reason scrap is being refused at some points and users are generally more exacting in their requirements. Several of the steel foundry grades have declined 50c. a ton and the blast furnace grades are off 25c. a ton. The May scrap list of the Norfolk & Western contains 4500 gross tons. The award of the May list of the Pennsylvania Railroad is being watched with considerable interest in view of the fact that market prices have declined since the closing of the April list.

Prices per gross ton delivered consumers' yards in Pittsburgh and points taking the Pittsburgh district freight rate:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel	$18.00 to $18.50
No. 2 heavy melting steel	15.75 to 16.25
Scrap rails	17.50 to 18.00
Compressed sheet steel	17.75 to 18.25
Bundled sheets, sides and ends	16.00 to 16.50
Cast iron carwheels	16.00 to 16.50
Sheet bar crops, ordinary	18.75 to 19.25
Heavy breakable cast	13.00 to 14.00
No. 2 railroad wrought	18.00 to 18.50
Hvy. steel axle turnings	16.00 to 17.00
Machine shop turnings	11.00 to 11.50
Acid Open-Hearth Grades:	
Railr. knuckles and couplers	21.00 to 21.50
Railr. coil and leaf springs	21.00 to 21.50
Rolled steel wheels	21.00 to 21.50
Low phos. billet and bloom ends	22.50 to 23.00
Low phos., mill plates	22.50 to 23.00
Low phos., light grades	20.00 to 21.00
Low phos., sheet bar crops	21.00 to 22.00
Heavy steel axle turnings	16.00 to 17.00
Electric Furnace Grades:	
Low phos., punchings	20.00 to 21.00
Hvy. steel axle turnings	16.00 to 17.00
Blast Furnace Grades:	
Short shoveling steel turnings	11.50 to 12.50
Short mixed borings and turnings	11.50 to 12.50
Cast iron borings	11.50 to 12.50
Rolling Mill Grades:	
Steel car axles	21.50 to 22.00
Cupola Grades:	
No. 1 cast	15.00 to 16.00
Rails 3 ft. and under	20.00 to 21.00

Semi-Finished Steel, Raw Materials, Bolts and Rivets

Mill Prices of Semi-Finished Steel

Billets and Blooms

	Per Gross Ton
Rerolling, 4 in. and under 10 in., Pittsburgh	$36.00
Rerolling, 4 in. and under 10 in., Youngstown	36.00
Rerolling, 4 in. and under 10 in., Cleveland	36.00
Rerolling, 4 in. and under 10 in., Chicago	37.00
Forging quality, Pittsburgh	41.00

Sheet Bars

(Open Hearth or Bessemer)

	Per Gross Ton
Pittsburgh	$36.00
Youngstown	36.00
Cleveland	36.00

Slabs

(8 in. x 2 in. and under 10 in. x 10 in.)

	Per Gross Ton
Pittsburgh	$36.00
Youngstown	36.00
Cleveland	36.00

Skelp

(F.o.b. Pittsburgh or Youngstown)

	Per Lb.
Grooved	1.85c. to 1.90c.
Universal	1.85c. to 1.90c.
Sheared	1.85c. to 1.90c.

Wire Rods

(Common soft, base)

	Per Gross Ton
Pittsburgh	$42.00
Cleveland	42.00
Chicago	43.00

Prices of Raw Material

Ores

Lake Superior Ores, Delivered Lower Lake Ports

	Per Gross Ton
Old range Bessemer, 51.50% iron	$4.80
Old range non-Bessemer, 51.50% iron	4.65
Mesabi Bessemer, 51.50% iron	4.65
Mesabi non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40

Foreign Ore, c.i.f. Philadelphia or Baltimore

	Per Unit
Iron ore, low phos., copper free, 55 to 58% iron in dry Spanish or Algerian	10.00c.
Iron ore, low phos., Swedish, average 68% iron	10.00c.
Iron ore, basic Swedish, average 65% iron	9.00c.
Manganese ore, washed, 52% manganese, from the Caucasus	33.00c. to 35.00c.
Manganese ore, Brazilian, African or Indian, basic 50%	33.00c. to 35.00c.
Tungsten ore, high grade, per unit, in 60% concentrates	$16.00

	Per Gross Ton
Chrome ore, 45 to 50% Cr_2O_3, crude, c.i.f. Atlantic seaboard	$22.00 to $24.00

	Per Lb.
Molybdenum ore, 85% concentrates of MoS_2, delivered	50c. to 55c.

Coke

	Per Net Ton
Furnace, f.o.b. Connellsville prompt	$2.75 to $2.85
Foundry, f.o.b. Connellsville prompt	3.75 to 4.85
Foundry, by-product, Ch'go ovens	8.00
Foundry, by-product, New England, del'd	11.00
Foundry, by-product, Newark or Jersey City, delivered	9.00 to 9.40
Foundry, by-product, Phila	9.00
Foundry, Birmingham	5.00
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry by-prod., del'd St. Louis	9.00

Coal

	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	$1.25 to $1.75
Mine run coking coal, f.o.b. W. Pa. mines	1.50 to 1.75
Gas coal, ¾-in., f.o.b. Pa. mines	1.90 to 2.00
Mine run gas coal, f.o.b. Pa. mines	1.65 to 1.75
Steam slack, f.o.b. W. Pa. mines	80c. to 90c.
Gas slack, f.o.b. W. Pa. mines	1.00 to 1.10

Ferromanganese

	Per Gross Ton
Domestic, 80%, seaboard	$105.00
Foreign, 80%, Atlantic or Gulf port, duty paid	105.00

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	$31.00 to $34.00
Domestic, 16 to 19%	29.00 to 32.00

Electric Ferrosilicon

	Per Gross Ton Delivered
50%	$83.50
75%	130.00

	Per Gross Ton Furnace		*Per Gross Ton Furnace*
10%	$35.00	12%	$39.00
11%	37.00	14 to 16%	45.00

Bessemer Ferrosilicon

F.o.b. Jackson County, Ohio, Furnace

	Per Gross Ton		*Per Gross Ton*
10%	$31.00	12%	$35.00
11%	33.00		

Silvery Iron

F.o.b. Jackson County, Ohio, Furnace

	Per Gross Ton		*Per Gross Ton*
6%	$24.00	10%	$29.00
7%	25.00	11%	31.00
8%	26.00	12%	33.00
9%	27.00		

Other Ferroalloys

Ferrotungsten, per lb., contained metal del'd	$1.35
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads	11.00c.
Ferrovanadium, per lb. contained vanadium, f.o.b. furnace	$3.15 to $3.65
Ferrocarbontitanium, 15 to 18%, per net ton, f.o.b. furnace, in carloads	$160.00
Ferrophosphorus, electric or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per gross ton	$91.00
Ferrophosphorus, electric 24%, f.o.b. Anniston, Ala., per gross ton	$122.50

Fluxes and Refractories

Fluorspar

	Per Net Ton
Domestic, 85% and over calcium fluoride, not over 5% silica, gravel, f.o.b. Illinois and Kentucky mines	$18.00
No. 2 lump, Illinois and Kentucky mines	20.00
Foreign, 85% calcium fluoride, not over 5% silica, c.i.f. Atlantic port, duty paid	$18.00 to $18.50
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silica, f.o.b. Illinois and Kentucky mines	32.50

Fire Clay Brick

	Per 1000 f.o.b. Works High-Heat Duty Brick	Intermediate Heavy Duty Brick
Pennsylvania	$43.00 to $46.00	$35.00 to $38.00
Maryland	43.00 to 46.00	35.00 to 38.00
New Jersey	50.00 to 65.00	.....
Ohio	43.00 to 46.00	35.00 to 38.00
Kentucky	43.00 to 46.00	35.00 to 38.00
Missouri	43.00 to 46.00	35.00 to 38.00
Illinois	43.00 to 46.00	35.00 to 38.00
Ground fire clay, per ton	7.00	

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	$43.00
Chicago	52.00
Birmingham	50.00
Silica clay, per ton	$8.50 to 10.00

Magnesite Brick

	Per Net Ton
Standard sizes, f.o.b. Baltimore and Chester, Pa.	$65.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00
Standard size	45.00

Chrome Brick

	Per Net Ton
Standard size	$45.00

Mill Prices of Bolts, Nuts, Rivets and Set Screws

Bolts and Nuts

Per 100 Pieces

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
†Machine bolts	70
†Carriage bolts	70
Lag bolts	70
Plow bolts, Nos. 1, 2, 3 and 7 heads	70
Hot-pressed nuts, blank or tapped, square	70
Hot-pressed nuts, blank or tapped, hexagons	70
C.p.c. and t. square or hex. nuts, blank or tapped	70
Washers*	7.00c. to 6.75c. per lb. off list

*F.o.b. Chicago, New York and Pittsburgh.

†Bolts with rolled thread up to an including ¼ in. x 6 in. take 10 per cent lower list prices.

Bolts and Nuts

	Per Cent Off List
Semi-finished hexagons nuts	70
Semi-finished hexagons castellated nuts, S.A.E.	70
Stove bolts in packages, Pittsburgh	80, 10 and 5
Stove bolts in packages, Chicago	75, 20, 10 and 5
Stove bolts in packages, Cleveland	75, 20, 10 and 5
Stove bolts in bulk, Pittsburgh	80, 10, 5 and 2½
Stove bolts in bulk, Chicago	75, 20, 10, 5 and 2½
Stove bolts in bulk, Cleveland	75, 20, 10, 5 and 2½
Tire bolts	60, 5 and 5

Discounts of 70 per cent off on bolts and nuts applied on carload business. For less than carload orders discounts of 55 60 per cent apply.

Large Rivets

(½-In. and Larger)

	Base per 100 Lb.
F.o.b. Pittsburgh or Cleveland	$3.10
F.o.b. Chicago	3.20

Small Rivets

(½-In. and Smaller)

	Per Cent Off List
F.o.b. Pittsburgh	70 and 10
F.o.b. Cleveland	70 and 10
F.o.b. Chicago	70 and 10

Cap and Set Screws

(Freight allowed up to but not exceeding 50c. per 100 lb. on lots of 200 lb. or more)

	Per Cent Off List
Milled cap screws	80, 10 and 5
Milled standard set screws, case hardened,	80 and 5
Milled headless set screws, cut thread	75 and 10
Upset hex. head cap screws, U.S.S. thread	85
Upset hex. cap screws, S.A.E. thread	85
Upset set screws	80, 10 and 5
Milled studs	70

Chicago

Sales Again in Excess of Shipments and Operations Continue at Practical Ingot Capacity

CHICAGO, May 7.—Daily rate of steel shipments from Chicago mills holds steady at practical ingot capacity and in the meantime buyers are again showing greater disposition to place new orders. For several weeks sales have lagged, a situation normally expected at this season, which is midway between quarterly buying periods. However, sales in the last seven days have shown a marked increase, the total being well in excess of shipments. This situation is forestalling an improvement in deliveries, which are less favorable to consumers than a week ago. With buyers' stocks at the minimum, new orders almost without exception are being entered on mill books for rolling at the earliest possible date. Although some hold to the opinion that current business is all for actual consumption, there nevertheless are some signs that point to pyramiding of orders, so that customers may be better satisfied as to needs. To offset this producers are carefully scheduling allotments, but as consumption exceeds production, consumers continue to turn their attention to markets to the East. Shipments of steel to Chicago by water are growing, the schedule now being two cargoes each week.

Specifications for finished steel were the heaviest in the last five weeks and the sixth highest week for any seven-day period so far this year.

Western warehouses are announcing advances in prices for sheets, wire, spikes and rivets. Producers entering south-central Michigan are taking orders for galvanized sheets at prices $2 a ton below the current market. Quotations for the same grade which goes to the roofing trade in the Southwest also are weak. Firmness in the local plate, shape and bar market is indicated by a great number of orders taken at 2.10c. and 2.15c. a lb., Chicago.

Pig Iron.—The third cargo of Lake Erie iron has been unloaded at Chicago and others are soon to follow. A boat load of low phosphorus English iron is expected to dock at Chicago in the next week. May shipments of Northern iron from local furnaces are holding at the average in April. New orders for fill-in tonnages continue in good volume and forward buying for delivery in June and the third quarter still attracts sellers. Stocks at furnaces are at the low point of the year but supplies on hand are well balanced.

Prices per gross ton at Chicago:

N'th'n No. 2 fdy., sil. 1.75 to 2.25	$20.00
N'th'n No. 1 fdy., sil. 2.25 to 2.75	20.50
Malleable, not over 2.25 sil.	20.00
High phosphorus	20.00
Lake Super. charcoal, sil. 1.50	27.04
So'th'n No. 2 fdy. (all rail)	$21.01 to 21.51
Low phos., sil. 1 to 2, copper free	29.50
Silvery, sil. 8 per cent	30.79
Bess. ferrosilicon, 14-15 per cent	46.29

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnace, not including an average switching charge of 61c. per gross ton.

Ferroalloys.—A number of users of spiegeleisen find that contracts placed at the beginning of this year will not cover their needs and several sizable replacement orders have been entered. Prices depend on tonnages involved, carloads being quoted at $34 a ton, Hazard, Pa.

Prices delivered Chicago: 80 per cent ferromanganese, $112.56; 50 per cent ferrosilicon, $83.50 to $88.50; spiegeleisen, 19 to 21 per cent, $40.76.

Plates.—New purchases of plates are in excess of shipments, and deliveries, as gaged by mill books, are not better than 12 to 14 weeks. There are signs of revival in construction of oil storage tanks. One order for delivery in the Southwest is for 3000 tons and fresh projects call for more than 15,000 tons for delivery in the South and West. Tank builders are heavily engaged and they are not free from difficulties in obtaining plate deliveries when needed. Reports are persistent concerning early requests for prices on new oil and gas line projects. One contemplated line is to extend from the Texas fields to Kansas City. Structural fabricators are in need of more plates, though individual orders are smaller than a year ago at this time. New railroad car orders in this district total 700, of which 500 are for the Union Pacific and 200 for the Northern Pacific. These will require 8000 tons of steel. Operations in Western car shops are steady, and there is promise of heavier output on the score that specifications to mills have expanded materially in the last 10 days. Water shipments inaugurated several weeks ago between Chicago and Milwaukee are no longer being made. This move was undertaken as an experiment to determine its practicability and cost. From information now available, it seems doubtful that the experiment will be carried further at this time.

Warehouse Business.—Distribution has been increasing at a rapid pace in recent weeks. Orders are well scattered. Prices for black and galvanized sheets have been advanced $5 a ton and quotations on annealed wire have been raised $3 a ton. Structural and boiler rivets are now quoted at $4 for 100 lb.

Structural Material.—Of primary interest in this market is the announcement by an architect that the development of air rights over the Illinois Central tracks is near at hand. The first project to be undertaken will be a 75-story tower structure which promoters plan to have under way before the end of the year. This building will call for more than 75,000 tons of steel. Other projects that are taking shape are a 25-story building for the Chicago Athletic Club and the World's Fair buildings. Outstanding among awards for the week is 5000 tons of steel for the 1929 bridge program of the Chicago & North Western. It is believed by some that the reassessment of real estate in Cook County is a primary factor in holding new construction in check. The general impression is that in many cases tax bills will be double those rendered a year ago. Fabricators are finding a greater number of small jobs, and shop output is holding steady at a rate which is below seasonal expectations.

Mill prices on plain material, per lb.: 2.05c. to 2.15c. base, Chicago.

Bars.—New buying and specifications for soft steel bars are heavier than current shipments. Deliveries continue to lengthen, and mill books are now filled well into July. Prices show a strong tendency to advance. A month or so ago few orders were taken at 2.10c. and 2.15c. a lb., Chicago, whereas today these quotations are being made with increasing frequency. Warehouses are taking increasing quantities of mild steel bars. Specifications for iron bars are in excess of production, and deliveries are less favorable to a growing circle of users. Use of alloy steel bars shows little deviation from week to week. The automobile industry as a whole is still a consistent and heavy consumer. Deliveries range from four to five weeks. Chicago district rail steel bar mills are operating on a double turn, yet shipments are smaller than specifications, and deliveries have been extended to a range of three to four weeks. Unfavorable weather is given as the reason for a drop in fence post orders.

Wire Products.—May opens with deliveries of wire on a par with the rate in April, which was one of the best months in several years. The dealer trade is making more headway, especially in the movement of fencing and nails, though the nail volume is small when compared with the spring demand in recent years. Jobbers are cautious, and most of the new orders are at extremely close range. The automobile industry, which is the backbone of the industrial wire business, continues to take this commodity at an undiminished rate. Unfavorable weather in many parts of the country has held back distribution, and on that score sellers hope that the spring demand will be prolonged this year. Mill stocks show a further decline.

Cast Iron Pipe.—Sales of cast iron pipe are heavier than in the previous week and fresh inquiry is promising. Milwaukee closed for a round tonnage with the United States Pipe & Foundry Co., Lynchburg Foundry Co. and James B. Clow & Sons. The last-named company was successful bidder through two contractors on the bulk of the 86,000 ft. of 4 to 16-in. pipe placed by Franklin County, Ohio. Coal City, Ill., is said to have purchased

40,000 ft. of 2 to 6-in. pipe. The American Cast Iron Pipe Co. and the United States company are low bidders on 3300 tons of 6 to 16-in. pipe for Detroit. Among fresh inquiries are 770 tons of 24-in. pipe for Chicago and 115 tons of 4 to 8-in. pipe for Miamisburg, Ohio. New orders include a greater number of single carloads. Specifications against old purchases by public utilities are liberal. Deliveries are prompt on most sizes.

Prices per net ton, deliv'd Chicago: Water pipe, 6-in. and over, $44.20 to $46.20; 4-in., $48.20 to $50.20; Class A and gas pipe, $3 extra.

Reinforcing Bars.—Inquiries and awards are lighter than a week ago. Shops are engaged at 60 per cent of capacity, with the tendency downward. Various estimates place the volume of orders for the first four months of this year at 50 per cent of the total in the corresponding period in 1928. Several railroads have closed for a few carloads of reinforcing bars. Stocks at warehouses are small and not well balanced. Mill rollings of deformed bars—usually at six week intervals—are being deferred two or three weeks. Prices remain unstable under the stress of keen competition for going business.

Rails and Track Supplies.—Two orders for standard-section rails total 10,000 tons. Purchases of track supplies amount to 3000 tons, and a liberal amount of inquiry is before the trade. The light rail market is unusually dull. Western railroads, hampered in rail laying earlier in the year because of unfavorable weather, are now putting rails down at a rapid rate and are exerting unusual pressure on mills for heavier shipments.

Prices f.o.b. mill, per gross ton: Standard section open-hearth and Bess. rails, $43; light rails, rolled from billets, $36. *Per lb.:* Standard railroad spikes, 2.80c.; track bolts with square nuts, 3.80c.; steel tie plates, 2.15c.; angle bars, 2.75c.

Old Material.—Sales of heavy melting steel late last week entablished lower prices. A round tonnage of this grade brought $16 a gross ton, delivered, and offers made since then at that figure have been turned down by consumers. A large buyer of cast iron borings has been successful in placing an order at $10.75 a gross ton, delivered, which is 25c. a ton below quotations a week ago. Weakness in prices is confined almost wholly to the heavy tonnage grades, supplies of which are more liberal. Producers of specialties are paying more attention to getting out their products than to loading scrap. Plate scrap is scarce in the absence of shipments by railroad car building shops. Prices for some cast grades are leaning to the weak side, as incoming shipments more than balance consumption. Among railroad offerings are 50,000 tons by the Pennsylvania, 7000 tons by the Rock Island, 2000 tons by the Wabash and 1000 tons by the Chicago & Eastern Illinois.

Prices deliv'd Chicago district consumers:

	Per Gross Ton
Basic Open-Hearth Grades:	
Heavy melting steel	$15.50 to $16.00
Shoveling steel	15.50 to 16.00
Frogs, switches and guards, cut apart, and misc. rails	17.00 to 17.50
Hydraul. compressed sheets	13.75 to 14.25
Drop forge flashings	11.00 to 11.50
Forg'd cast and r'l'd steel carwheels	19.00 to 19.50
Railroad tires, charg. box size	19.00 to 19.50
Railroad leaf springs cut apart	19.00 to 19.50
Acid Open-Hearth Grades:	
Steel couplers and knuckles	17.50 to 18.00
Coil springs	20.00 to 20.50
Electric Furnace Grades:	
Axle turnings	16.25 to 16.75
Low phos. punchings	18.00 to 18.50
Low phos. plates, 12 in. and under	17.50 to 18.00
Blast Furnace Grades:	
Axle turnings	11.25 to 11.75
Cast iron borings	10.50 to 11.00
Short shoveling turnings	10.50 to 11.00
Machine shop turnings	7.50 to 8.00
Rolling Mill Grades:	
Iron rails	16.00 to 16.50
Rerolling rails	17.50 to 18.00
Cupola Grades:	
Steel rails less than 3 ft.	18.75 to 19.25
Steel rails less than 2 ft.	19.75 to 20.25
Angle bars, steel	17.50 to 18.00
Cast iron carwheels	14.50 to 15.00
Malleable Grades:	
Railroad	19.00 to 19.50
Agricultural	15.75 to 16.25
Miscellaneous:	
*Relaying rails, 56 to 60 lb.	23.00 to 25.00
*Relaying rails, 65 lb. and heav.	26.00 to 31.00
	Per Net Ton
Rolling Mill Grades:	
Iron angles and splice bars	15.00 to 15.50
Iron arch bars and transoms	21.50 to 22.00
Iron car axles	27.00 to 27.50
Steel car axles	17.50 to 18.00
No. 1 railroad wrought	14.25 to 14.75
No. 2 railroad wrought	13.75 to 14.25
No. 1 busheling	12.00 to 12.50
No. 2 busheling	7.00 to 7.50
Locomotive tires, smooth	14.50 to 15.00
Pipes and flues	10.00 to 10.50
Cupola Grades:	
No. 1 machinery cast	15.50 to 16.00
No. 1 railroad cast	15.00 to 15.50
No. 1 agricultural cast	14.00 to 14.50
Stove plate	12.75 to 13.25
Grate bars	12.00 to 13.50
Brake shoes	12.00 to 12.50

*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

Coke.—Shipments of by-product foundry coke are steady, reflecting a uniformity of iron melt in this district. Spot orders are scarce. Prices are firm at $8 a ton f.o.b., local ovens.

Bolts, Nuts and Rivets.—Specifications for these commodities are expanding as the month of May progresses. Among the users of larger quantities are the railroads. Prices are steady and spot buying is in moderate volume. Consumers' stocks are reported as being low.

Sheets.—Further reduction in the rate of sheet production is being forced because of the need of semi-finished steel for other purposes. Curtailment in operations comes at a time when new purchases are heavier and the aggregate of specifications would normally dictate larger output. The roofing trade has not reached the volume expected at this time of the year. Competition for orders of this kind is keen, and prices are sagging in the Southwest. Light manufacturing trade is busy. Jobbers are distributing larger quantities of sheets.

Base prices per lb., deliv'd from mill in Chicago: No. 24 black sheets, 3.10c.; No. 24 galv., 3.85c.; No. 10 blue ann'l'd, 2.35c. Deliv'd prices at other Western points are equal to the freight from Gary, plus the mill prices, which are 5c. per 100 lb. lower than Chicago delivered prices.

Warehouse Prices, f.o.b. Chicago

	Base per Lb.
Plates and structural shapes	3.10c.
Soft steel bars	3.00c.
Reinforc'g bars, billet steel	2.35c. to 2.40c.
Reinforc'g bars, rail steel	1.90c. to 2.05c.
Cold-fin. steel bars and shafting—	
Rounds and hexagons	3.60c.
Flats and squares	4.10c.
Bands (⅛ in. in Nos. 10 and 12 gages)	3.20c.
Hoops (No. 14 gage and lighter)	3.75c.
Black sheets (No. 24)	4.05c.
Galv. sheets (No. 24)	4.90c.
Blue ann'l'd sheets (No. 10)	3.35c.
Spikes, ⅜ in. and larger	3.55c.
Track bolts	4.55c.
Rivets, structural	4.00c.
Rivets, boiler	4.00c.
	Per Cent Off List
Machine bolts	60
Carriage bolts	60
Coach or lag screws	60
Hot-pressed nuts, sq., tap. or blank	60
Hot-pressed nuts, hex., tap. or blank	60
No. 8 black ann'l'd wire, per 100 lb.	$3.45
Com. wire nails, base per keg	3.20
Cement c't'd nails, base per keg	3.20

More Coal Converted into Gas and By-Products

WASHINGTON, May 7.—Reflecting an average daily increase of 2.8 per cent, 132 steel-works plants consumed 1,327,592 net tons of gas coal in the 59 days of February and March, 1929, as against 1,313,677 tons in the 60 days of the corresponding months of 1928, according to the Bureau of Mines. The steel works' daily average for February-March was 22,502 tons, against 21,895 tons for the corresponding two months of last year.

Consumption by 231 coal gas works reporting to the bureau totaled 643,785 tons during the two-month period of the current year, against 650,305 tons for the corresponding period of last year, a gain of 0.7 per cent in daily consumption, which averaged 10,912 tons, against 10,837 tons.

German Steel Exports Gain

WASHINGTON, May 7.—Exports of iron and steel products from Germany in March rose to 294,521 metric tons, an increase of 21,177 tons over those for February, while imports into that country increased to 105,545 tons, a gain of 6163 tons, according to radiograms received by the Department of Commerce from Berlin.

Pig iron production in Germany increased to 1,061,214 tons from 981,695 tons, while steel output was 1,269,874 tons, compared with 1,314,373 tons. There were 97 blast furnaces in operation at the end of March, a gain of one over the number active at the end of February.

Iron Masters of Brooklyn and Long Island, Inc., has been incorporated to succeed to the Iron League of Brooklyn and Long Island. Louis Klaff is president. Companies in the organization are: Eveready Iron Works, Mansfield Iron Works, Gold Seal Iron Works, David H. Smith & Sons, Inc., Kalter Iron Works, Schlecker & Alper, Simon Holland & Son, Gaynor & Rosenblum, Kusel & Eisen, Jacob White Iron Works, Hygrade Iron Works, A. Gordon Iron Works, Dependable Iron Works. George Boochever, 965 Flatbush Avenue, Brooklyn, is counsel for the organization.

Cleveland

Specifications, Production and Shipments Continue at High Rate—Broad Demand for Sheets

CLEVELAND, May 7.—The pressure for deliveries of finished steel shows no decrease and specifications appear to be fully as heavy as in the latter part of April. Although production continues at a heavy rate, no improvement is reported in deliveries. A few of the automobile companies have slightly reduced production but apparently not enough to make an appreciable effect in demand for steel, although there has been some reduction in the mill backlogs of alloy steel bars. New inquiry from automobile manufacturers is not coming to the stamping plants in so heavy a volume as recently, and automobile companies are showing less eagerness to get round tonnages on the mill books for extended future delivery.

The demand for light plates has increased and deliveries have become more extended. Motor truck bodies are taking a large tonnage and some of the tank manufacturers have increased operations. Structural inquiry is light. Considerable steel will be required for the new dock to be built by the Hocking Valley Railroad in Toledo. This will take 1500 tons of steel piling and the planned equipment will include three ore unloaders and four car dumpers. Detroit has an inquiry out for 1500 tons of steel pipe and the Cleveland plant of the Chase Brass & Copper Co. has placed with the American Construction Co. a contract requiring 260 tons of riveted steel pipe.

Little interest is being shown in the price situation as the market is firm at 1.95c. to 2c., Cleveland, for steel bars and 1.95c., Pittsburgh, for plates and structural material.

Pig Iron.—The pig iron melt is holding up to the recent heavy volume. Although a slowing down in the automotive industry is looked for, orders for May shipment from foundries affiliated with that industry indicate that they will take as much iron this month as during any previous month this year. There is not much buying for the third quarter, although one producer has inquiries for 12,000 tons, mostly for that delivery. Sales by Cleveland interests the past week fell off, totaling 17,000 tons in foundry and malleable iron, most of which was purchased to fill in for the second quarter. Among new inquiries is one from the General Electric Co. for 750 to 1000 tons of special analysis iron for its Erie works. The market is firm, with no change in prices. Some effort was made during the week to advance 50c. a ton the present ruling local price of $19, furnace, for foundry and malleable iron for Cleveland delivery, this price not having been changed since the recent advance in the Valley district. However, for the present no advance will be put in effect. For outside shipment, $18.50 is the ruling price. Some of the Lake furnaces quote $19 for western Ohio and Indiana shipment. In Michigan, there is a price range of $20 to $20.50, depending on the shipping point.

Prices per gross ton at Cleveland:

N'th'n fdy., sil. 1.75 to 2.25	$19.50
S'th'n fdy., 1.75 to 2.25	$21.00 to 21.50
Malleable	19.50
Ohio silvery, 8 per cent	29.00
Basic Valley furnace	18.50
Stand. low phos., Valley	26.50 to 27.00

Prices except on basic and low phosphorus are delivered Cleveland. Freight rates: 50c. from local furnaces; $3 from Jackson, Ohio; $6 from Birmingham.

Iron Ore.—Water shipments of Lake Superior ore in April broke all records for the month. The movement was 2,516,241 gross tons, compared with 5946 tons during April last year. The previous best record for April was in 1925, when 2,120,715 tons were shipped.

Semi-Finished Steel.—Specifications continue in heavy volume and while some buyers complain that they are not getting shipments as fast as wanted, their requirements appear to be well taken care of. The leading Cleveland producer is still fully committed for four weeks. There is as yet no talk of third quarter contracts, and it is not expected that buying for that delivery will start for 30 days. Until then the recent advance in prices will not be fully tested.

Sheets.—Demand shows little if any falling off. While there is evidently a slight decrease in orders from the automotive industry, this seems to be offset by a more active demand from other sources. Demands for blue annealed sheets have increased and there is considerable pressure for deliveries. The barrel manufacturers are taking a larger tonnage than recently. Production is continuing at a maximum rate and deliveries show no improvement, most mills being committed for six to eight weeks. It is reported that some of the independent mills expect shortly to announce an advance in prices of $2 a ton to apply on third quarter business. However, positive confirmation of an advance is lacking. Black and galvanized sheets are still being shaded to 2.85c. and 3.60c., Pittsburgh, respectively, but blue annealed sheets appear firm at 2.20c.

Wire Products.—Nails are in better demand than recently and prices are firmer, holding generally to $2.65 to $2.75 per keg in most sections. There is also more activity in wire.

Reinforcing Bars.—Small lots are moving well but there is little inquiry for round lots. Prices continue irregular. Cut lengths are going as low as 2.25c. for good sized warehouse lots. Small lots are bringing 2.49c.

Warehouse Business.—Sales are holding up to the April volume. Slow mill deliveries are helping warehouse business, this being particularly true of light plates and sheets. Structural material is the only product that is not active. More jobbers have joined in the advance on black and galvanized sheets to 3.75c. for the former and 4.60c. for the latter, with 15c. more for less than ten bundles.

Old Material.—While the market has a weaker tone, this appears to be largely due to weakness in other districts, as quotations here are unchanged. A Cleveland mill bought a few thousand tons of selected No. 1 heavy melting steel at $16.75 and a Valley mill took 2000 tons from a Cleveland dealer at $18. Local dealers say they are unable to buy scrap to fill outstanding orders at prices lower than have prevailed recently. Prices on steel making grades are weaker in the Valley district, where No. 1 heavy melting steel is quoted at $17.75 to $18 and compressed sheet steel at $17 to $17.50. Considerable scrap is now coming to Cleveland mills by water from Detroit.

Prices per gross ton delivered consumers' yards:

Basic Open-Hearth Grades	
No. 1 heavy melting steel	$15.50 to $16.00
No. 2 heavy melting steel	15.00 to 15.50
Compressed sheet steel	15.00 to 15.50
Light bundled sheet stampings	12.00 to 12.50
Drop forge flashings	13.00 to 13.25
Machine shop turnings	9.50 to 10.00
No. 1 railroad wrought	13.50 to 14.00
No. 2 railroad wrought	16.00 to 16.50
No. 1 busheling	12.50 to 13.00
Pipes and flues	9.00 to 9.50
Steel axle turnings	12.50 to 13.00
Acid Open-Hearth Grades	
Low phos., forging crops	18.50 to 19.00
Low phos., billet, bloom and slab crops	18.50 to 19.00
Low phos. sheet bar crops	18.00 to 18.50
Low phos. plate scrap	18.00 to 18.50
Blast Furnace Grades	
Cast iron borings	11.25 to 11.50
Mixed borings and short turnings	11.25 to 11.50
No. 2 busheling	11.25 to 11.50
Cupola Grades	
No. 1 cast	17.25 to 17.50
Railroad grate bars	11.00 to 12.00
Stove plate	12.00 to 12.50
Rails under 3 ft	16.75 to 17.25
Miscellaneous	
Railroad malleable	16.00 to 16.50
Rails for rolling	16.25 to 16.50

Strip Steel.—Mills are getting a good volume of specifications for hot-rolled strip steel, although orders with some producers are not as heavy as recently, and these have caught up somewhat on delivery. Some mills are still making shipments against the lower-priced first quarter contracts. There is not much new business. The

Warehouse Prices, f.o.b. Cleveland

	Base per Lb.
Plates and struc. shapes	3.00c.
Soft steel bars	3.00c.
Reinforc. steel bars	2.25c. to 2.50c.
Cold-fin. rounds and hex	3.65c.
Cold-fin. flats and sq	4.15c.
Hoops and bands, No. 12 to ¼ in., inclusive	3.25c.
Hoops and bands, No. 13 and lighter	3.65c.
Cold-finished strip	*5.95c.
Black sheets (No. 24)	3.70c. to 3.90c.
Galvanized sheets (No. 24)	4.25c. to 4.75c.
Blue ann'l'd sheets (No. 10)	3.25c.
No. 9 ann'l'd wire, per 100 lb	$2.95
No. 9 gal. wire, per 100 lb	3.40
Com. wire nails, base per keg	2.95

*Net base, including boxing and cutting to length.

demand for cold-rolled strip shows no falling off, specifications being heavy, and there is also a good amount of new business. Mills are filled up for four to eight weeks. The market is firm at 2.75c., Cleveland.

Coke.—Shipments of foundry coke against contracts are good, but the market does not show much activity. Prices are unchanged. Ohio by-product foundry coke is quoted at $8.25, Painesville, for May shipment.

New York

Advances in Plates, Bars, Shapes and Sheets a Possibility—Pig Iron Demand Drags

NEW YORK, May 7.—Pig iron buying is still confined to relatively small tonnages for fill-in purposes, and bookings in this district for the week totaled 6000 to 7000 tons. The only current inquiry of any size calls for 3000 to 8000 tons for deliveries extending into the third quarter. Otherwise, little interest is manifested in pig iron for next quarter on the part of either buyers or sellers. Melters are not yet satisfied that the latest price advances will hold, while most furnaces are so well booked that they are not yet in pressing need of new business. The course of steel business will also have a bearing on the market, since any let-up in the pressure on the mills would release some steel works blast furnace output for merchant sale. In New England the Whitin Machine Works, Whitinsville, Mass., has not yet taken action on its inquiry for 2000 tons of No. 1X for third quarter, and may decide to buy only half that amount. The general state of foundry melt is still excellent. Shipments are in the largest volume so far this year, and virtually no suspensions are reported. Pig iron has not yet commenced to move by barge from Buffalo, although the State barge canal is reported open to navigation. Current prices continue to range from $18 to $19, base Buffalo, for foundry iron. Eastern Pennsylvania foundry iron is quoted at $20, base furnace, and higher, depending on competition encountered in this territory.

Prices per gross ton, delivered New York district:

Buffalo No. 2 fdy. sil. 1.75 to 2.25	$22.91 to $23.91
*Buf. No. 2, del'd east. N. J.	21.28 to 22.28
East. Pa. No. 2 fdy., sil. 1.75 to 2.25	21.39 to 22.52
East. Pa. No. 2X fdy., sil. 2.25 to 2.75	21.89 to 23.02

Freight rates: $4.91 from Buffalo, $1.39 to $2.52 from eastern Pennsylvania.

*Price delivered to New Jersey cities having rate of $3.28 a ton from Buffalo.

Ferroalloys.—Sales of about 500 tons of ferromanganese are reported for the week at unchanged prices. There was also about 100 tons of spiegeleisen sold at no change in quotations. Production of spiegeleisen by three companies in April was 21,993 gross tons, the largest in many months. Larger use of this alloy in various steel-making operations is reported.

Warehouse Business.—Most jobbers report a slight slackening in demand compared with the second half of April, but there is still a fairly active business in structural material, and a moderate tonnage of galvanized sheets is moving in small lots. Consumers of black sheets have been more active buyers recently, and some who usually deal with the mills have purchased from warehouse stocks, evidently because of the necessity for prompt shipment.

Cast Iron Pipe.—Buying is almost entirely limited to lots of less than 100 tons. Competition among Northern foundries is keen. A few hundred tons bought by a municipality brought out a low bid that figured back to slightly more than $31, f.o.b. foundry. Some tonnages for export are in the market, including one for several thousand tons. Yonkers, N. Y., has awarded about 300 tons of 8-in. water pipe to R. D. Wood & Co.

Prices per net ton deliv'd New York: Water pipe, 6-in. and larger, $36.60 to $37.60; 4-in. and 5-in., $41.60 to $42.60; 3-in., $51.60 to $52.60. Class A and gas pipe, $3 extra.

Reinforcing Bars.—Distributers are experiencing a seasonal expansion of business, with the placing of highway contracts by municipalities, counties and States. Specifications are now being received against recent subway contracts. With the decline in speculative building, public work has assumed greater importance as a source of business in reinforcing steel. Distributers find that deliveries from mills range from three to four weeks, compared with about two weeks one year ago.

Billet steel reinforcing bars in 40, 50 and 60-ft. lengths, 2.05c. per lb., Pittsburgh, and 2.30c. per lb., Pittsburgh warehouse, for cut lengths. Out of New York warehouse, 2.90c. per lb. for lots of 5 tons or more, 3.05c. for lots of 2 to 5 tons and 3.30c. for less than 2 tons, all delivered at job.

Coke. — Standard furnace coke ranges from $2.75 to $2.85 a net ton, Connellsville, and standard foundry is inactive at $3.50 to $3.75 a net ton, Connellsville. Special brands of foundry grade are quoted at $4.85 a net ton, ovens, or $8.56, delivered to northern New Jersey, Jersey City and Newark, and $9.44 to New York and Brooklyn. By-product coke is quoted at $9 to $9.40 per net ton, Newark or Jersey Ctiy, and $10.06, New York or Brooklyn.

Finished Steel.—An advance in prices of plates, shapes, bars and sheets is being freely mentioned as a possibility. No definite announcement regarding third quarter prices has been made by any mill, but some sheet producers have taken third quarter contracts at prices to be named later. While new business is not conspicuous except in structural steel, the flow of specifications against contracts is unabated. Local steel sellers, who, a few weeks ago, were doubtful as to how the second quarter would wind up, are now predicting a continuance of activity through the third quarter, which would be in contrast to the usual dullness of the summer months. It is regarded as significant that the rate of steel out-

Warehouse Prices, f.o.b. New York

	Base per Lb.
Plates and structural shapes	3.30c.
Soft steel bars, small shapes	3.25c.
Iron bars	3.24c.
Iron bars, Swed. charcoal	7.00c. to 7.25c.
Cold-fin. shafting and screw stock—	
Rounds and hexagons	3.60c.
Flats and squares	4.10c.
Cold-roll. strip, soft and quarter hard	5.15c. to 5.40c.
Hoops	4.25c.
Bands	3.75c.
Blue ann'l'd sheets (No. 10)	3.85c. to 3.90c.
Long terne sheets (No. 24)	5.80c.
Standard tool steel	12.00c.
Wire, black annealed	4.50c.
Wire, galv. annealed	5.15c.
Tire steel, 1½ x ½ in. and larger	3.30c.
Smooth finish, 1 to 2½ x ¼ in. and larger	3.65c.
Open-hearth spring steel, bases	4.50c. to 7.00c.
	Per Cent Off List
Machine bolts, cut thread:	
¾ x 6 in. and smaller	60
1 x 30 in. and smaller	50 to 50 and 10
Carriage bolts, cut thread:	
½ x 6 in. and smaller	60
¾ x 20 in. and smaller	50 to 50 and 10
Coach screws:	
½ x 6 in. and smaller	60
1 x 6 in. and smaller	50 to 50 and 10
Boiler Tubes—	Per 100 Ft.
Lap welded, 2-in	$17.33
Seamless steel, 2-in	20.24
Charcoal iron, 2-in	25.00
Charcoal iron, 4-in	67.00

Discounts on Welded Pipe

Standard Steel—	Black	Galv.
½-in. butt	46	29
¾-in. butt	51	37
1-3-in. butt	53	39
2½-6-in. lap	48	35
7 and 8-in. lap	44	17
11 and 12-in. lap	37	12
Wrought Iron—		
½-in. butt	5	+19
¾-in. butt	11	+ 9
1-1½-in. butt	14	+ 6
2-in. lap	5	+14
3-6-in. lap	11	+ 6
7-12-in. lap	3	+16

Tin Plate (14 x 20 in.)

	Prime	Seconds
Coke, 100 lb. base box	$6.45	$6.20
Charcoal, per Box—	A	AAA
IC	$9.70	$12.10
IX	12.00	14.25
IXX	13.90	16.00

Terne Plate (14 x 20 in.)

IC—20-lb. coating	$10.00 to $11.00
IC—30-lb. coating	12.00 to 13.00
IC—40-lb. coating	13.75 to 14.25

Sheets, Box Annealed—Black, C. R. One Pass

	Per Lb.
Nos. 18 to 20	3.80c.
No. 22	3.95c.
No. 24	4.00c.
No. 26	4.10c.
No. 28*	4.25c.
No. 30	4.50c.

Sheets, Galvanized

	Per Lb.
No. 14	4.40c.
No. 16	4.25c.
No. 18	4.40c.
No. 20	4.50c.
No. 22	4.60c.
No. 24	4.75c.
No. 26	5.00c.
No. 28*	5.25c.
No. 30	5.65c.

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

put could stand a 15 per cent reduction from the March-April Ingot production without going below the January output, and that was a month of high production, though it was surpassed by February and March. The only weak spot in the price situation is in black and galvanized sheets, which, in some instances, are still being sold at $2 a ton under the announced prices for the second quarter. Considerable tonnage in structural shapes and plates is seeking placement with Eastern mills on account of the congested condition of mills at Chicago.

Mill prices per lb., deliv'd New York: Soft steel bars, 2.29c.; plates, 2.22½c.; structural shapes, 2.19½c.; bar iron, 2.14c.

Old Material.—Prices still show a downward trend on most grades. For No. 1 heavy melting steel brokers are offering $16 per ton, delivered to a consumer at Bethlehem, Pa., and $16.50 per ton, delivered Coatesville, Pa., or Claymont, Del. A consumer of No. 2 heavy melting steel at Pencoyd, Pa., is reported to have closed on a small tonnage of No. 1 heavy melting steel, not having received sufficient No. 2 steel for its requirements. Steel mill stove plate is quoted at $12 per ton, delivered to Phoenixville, Pa., and $12.50 per ton, delivered to Harrisburg, Pa. Yard grade of heavy melting steel is being shipped to Phoenixville or Harrisburg, Pa., at $13 per ton. It is stated that the iron and steel scrap from the Central Railroad of New Jersey will continue to be sold to the highest bidder each month and will not be disposed of on a contract basis. The next call for bids will be issued in June.

Dealers' buying prices per gross ton, f.o.b. New York:

No. 1 heavy melting steel	$13.00 to $13.50
Heavy melting steel (yard	8.25 to 9.50
No. 1 hvy. breakable cast	11.75 to 12.50
Stove plate (steel works)	8.50 to 8.75
Locomotive grate bars	8.75 to 9.00
Machine shop turnings	7.75 to 8.00
Short shoveling turnings	7.75 to 8.00
Cast borings (blast furn. or steel works)	7.00 to 7.25
Mixed borings and turnings	6.75 to 7.00
Steel car axles	19.25 to 19.75
Iron car axles	25.00 to 26.00
Iron and steel pipe (1 in. dia., not under 2 ft. long)	11.75
Forge fire	10.50 to 10.75
No. 1 railroad wrought	12.50 to 13.00
No. 1 yard wrought, long	11.50 to 12.00
Rails for rolling	13.50 to 14.00
Cast iron carwheels	12.00 to 12.25
Stove plate (foundry)	9.00 to 9.50
Malleable cast (railroad)	14.00 to 14.50
Cast borings (chemical)	10.50 to 11.00

Prices per gross ton, deliv'd local foundries:

No. 1 machry. cast	$17.00
No. 1 hvy. cast (columns, bldg. materials, etc.), cupola size	15.00
No. 2 cast (radiators, cast boilers, etc.)	14.50

The foundry department of the General Electric Co., Pittsfield, Mass., is experimenting on a five-day week. About 300 workers are involved. Approximately 3000 employees of the entire Pittsfield plant are eligible to vacations with pay under a new plan just announced by the company. The total number of employees at the plant is 7400.

Philadelphia

Steel Deliveries Less Extended—Shipyards Bidding for New Cruisers—Pig Iron Quiet

PHILADELPHIA, May 7.—Deliveries are slightly less extended on most steel products, but specifications for shipment on current contracts continue in good volume. Buying by automobile manufacturers has slackened in some cases, but the Ford Motor Co. is an active consumer and has contracted for a sizable tonnage of bars with an eastern Pennsylvania interest, which has been executing similar bar orders for some months. Plate mills are engaged with good tonnages from the railroads and tank builders, and sheet mills are beginning to receive some substantial business from radio manufacturers. Delaware River shipbuilders have large plate and shape requirements for shipbuilding contracts recently awarded and are bidding for the new scout cruisers to be placed by the Navy Department.

Pig Iron.—Orders for foundry iron are not large enough to bring out concessions from the current quotation of $21.50 per ton, furnace. The only sizable foundry iron purchase in recent weeks was about 30,000 tons placed by a Delaware River pipe foundry with a northern New York furnace at a delivered price reported to have been slightly less than $20 per ton. The same furnace interest is understood to have been awarded about 500 tons of malleable iron by a castings company at Columbia, Pa. The first cargo of Indian pig iron to arrive since February is expected about the middle of this month.

Prices per gross ton at Philadelphia:

East. Pa. No. 2, 1.75 to 2.25 sil.	$21.76 to $22.26
East. Pa. No. 2X, 2.25 to 2.75 sil.	22.26 to 22.76
East. Pa. No. 1X	22.76 to 23.26
Basic (del'd east. Pa.)	20.25 to 21.00
Gray forge	20.50 to 21.00
Malleable	21.25 to 21.75
Stand. low phos. (f.o.b. N. Y. State furnace)	22.00 to 23.00
Cop. b'r'g low phos. (f.o.b. furnace)	23.50 to 24.00
Va. No. 2 plain, 1.75 to 2.25 sil.	24.79
Va. No. 2X, 2.25 to 2.75 sil.	25.29

Prices, except as specified otherwise, are deliv'd Philadelphia. Freight rates: 76c. to $1.64 from eastern Pennsylvania furnaces; $4.54 from Virginia furnaces.

Billets.—Consumers are under contract for their requirements in this quarter, so that but little business has been closed at the new price of $36 per ton, Pittsburgh, for rerolling quality and $41 per ton, Pittsburgh, for forging billets.

Bars.—Deliveries are substantially unchanged at four to five weeks from some mills, but in certain cases producers are able to offer slightly earlier shipment. A large eastern Pennsylvania interest, which has been executing bar business for the Ford Motor Co., has booked a fresh order. Prices are firm and unchanged at 1.95c., Pittsburgh, or 2.27c. a lb., delivered Philadelphia.

Reinforcing Bars.—The new State building code, permitting full use of rail steel reinforcing bars in Philadelphia, has been signed by the Governor and is now in effect. The Columbia-Wrightsville, Pa., bridge requiring 4000 tons of reinforcing bars has not yet been awarded, but the low bidder for the bars is reported to be Edward T. Edwards, Columbia. The Olney High School, Philadelphia, will require 1600 tons of reinforcing bars. Billet steel reinforcing bars in 40, 50 and 60-ft. lengths are quoted at 2.05c., Pittsburgh, or 2.37c., delivered Philadelphia, with a $5 extra for cutting to length. Rail steel reinforcing bars are quoted at 1.95c. a lb., f.o.b. Franklin, Pa., or Tonawanda, N. Y., cut to required length, or 2.27c., delivered Philadelphia.

Shapes.—Prices are fairly well maintained at 1.95c. to 2c. a lb., f.o.b. nearest mill to consumer, or, on a basis of Pencoyd, Pa., 2.01c. to 2.06c., delivered Philadelphia. Fabricated steel prices are stronger. Deliveries from mills are slightly shorter than a few weeks ago, ranging from one to two weeks.

Plates.—Railroads are furnishing a steady tonnage and tank builders continue active buyers. Requirements of Delaware River yards for shipbuilding contracts recently awarded, promise a sizable tonnage. Prices are unchanged at 2.05c. a lb., Coatesville, or 2.15c., delivered Philadelphia.

Sheets.—Slackening of buying by some automobile manufacturers has opened certain mill schedules for slightly earlier deliveries than have been possible for a number of weeks. Radio manufacturers in this district

Warehouse Prices, f.o.b. Philadelphia

	Base per Lb.
Plates, ¼-in. and heavier	2.70c.
Plates, ⅛-in.	2.90c.
Structural shapes	2.70c.
Soft steel bars, small shapes, iron bars (except bands)	2.80c.
Round-edge iron	3.50c.
Round-edge steel, iron finished 1½ x 1½ in.	3.50c.
Round-edge steel, planished	4.30c.
Reinforc. steel bars, sq. twisted and deform.	2.60c. to 2.80c.
Cold-fin. steel, rounds and hex	3.60c.
Cold-fin. steel, sq. and flats	4.10c.
Steel hoops	3.40c.
Steel bands, No. 12 to ⅛-in., inclus.	3.15c.
Spring steel	5.00c.
*Black sheets (No. 24)	4.10c.
†Galvanized sheets (No. 24)	4.85c.
Blue ann'l'd sheets (No. 10)	3.25c.
Diam. pat. floor plates—	
¼-in.	5.30c.
⅛-in.	5.50c.
Rails	3.20c.
Swedish iron bars	6.60c.

*For 50 bundles or more; 10 to 49 bun., 4.10c. base; 1 to 9 bun., 4.35c. base.
†For 50 bundles or more; 10 to 49 bun., 4.95c. base; 1 to 9 bun., 5.30c. base.

are entering upon large production programs and are increasingly active buyers of deep drawing material. Prices are unchanged at 2.10c. to 2.20c. a lb., Pittsburgh, or 2.42c. to 2.52c., delivered Philadelphia, for blue annealed, 2.95c., Pittsburgh, or 3.27c., Philadelphia for black and 3.70c., Pittsburgh, or 4.02c., Philadelphia, for galvanized sheets.

Imports.—In the week ended May 4, a total of 7000 tons of iron ore arrived at this port from Algeria and 840 tons of chrome ore arrived from Portuguese Africa. Imports from the United Kingdom consisted of 50 tons of ferromanganese, 400 tons of spiegeleisen, 27 tons of steel scrap, 6 tons of steel bars, 2 tons of steel wire, 2 tons of strip steel. Other arrivals were 40 tons of ferrochrome from Switzerland and 11 tons of steel scrap from Germany.

Old Material.—About 10,000 tons of No. 1 heavy melting steel has been bought by a consumer at Steelton, Pa., at $16 a ton, delivered. A Pencoyd, Pa., mill has closed on a small tonnage of No. 1 steel at less than $17 a ton. No. 1 blast furnace scrap has been bought at $11 per ton, delivered Steelton, Pa. Although prices show no tendency to advance, except for occasional fluctuations on certain grades, the market is fairly stable and supplies of scrap are not believed to be excessive for the present rate of mill operations.

Prices per gross ton delivered consumers' yards, Philadelphia district:

No. 1 heavy melting steel	$16.50 to $17.00
Scrap T rails	16.00 to 16.50
No. 2 heavy melting steel	13.50 to 14.25
No. 1 railroad wrought	16.00 to 16.50
Bundled sheets (for steel works)	11.50 to 12.00
Hydraulic compressed, new	15.00 to 15.50
Hydraulic compressed, old	12.50 to 13.00
Machine shop turnings (for steel works)	11.50 to 12.00
Heavy axle turnings (or equiv.)	14.50 to 15.00
Cast borings (for steel works and roll. mill)	11.00 to 11.50
Heavy breakable cast (for steel works)	15.50 to 16.00
Railroad grate bars	13.00 to 13.50
Stove plate (for steel works)	13.00 to 13.50
No. 1 low phos., hvy., 0.04% and under	22.00 to 23.00
Couplers and knuckles	20.25 to 21.25
Rolled steel wheels	20.25 to 21.25
No. 1 blast furnace scrap	10.50 to 11.00
Wrot. iron and soft steel pipes and tubes (new specific.)	15.50
Shafting	19.00 to 19.50
Steel axles	23.00 to 23.50
No. 1 forge fire	14.00 to 14.50
Cast iron carwheels	18.00
No. 1 cast	16.50 to 17.00
Cast borings (for chem. plant)	16.00
Steel rails for rolling	17.00 to 17.00

Lower Daily Rate of Petroleum Flow

Production of petroleum in March is reported by the United States Bureau of Mines at 82,515,000 bbl., against 75,693,000 bbl. in February. But the daily rate fell to 2,661,800 bbl., from 2,703,300 bbl. Compared with last year, however, there has been a substantial gain in output. For the first quarter, 1929 showed 240,187,000 bbl., against 215,693,000 bbl. in 1928.

Railroad Equipment

Order for 650 Refrigerator Cars Largest Award of the Week

THE largest award of the week was 650 refrigerator cars for the Northwestern Refrigerator Co. The Northern Pacific has ordered 200 flat cars and will build 100 in its own shops. Other awards of the week included passenger and dining cars. The Erie Railroad is inquiring for 25 caboose cars.

Northwestern Refrigerator Co. has ordered 650 refrigerator cars from American Car & Foundry Co.

Erie is inquiring for 25 caboose cars.

Bangor & Aroostook has ordered two steel underframes from American Car & Foundry Co.

New York Central has ordered 10 suburban passenger cars from Standard Steel Car Co.

New York, New Haven & Hartford is in the market for six dining cars.

Manila Railroad has ordered 20 third-class passenger coaches from American Car & Foundry Co.

Chicago & North Western has ordered 24 suburban coaches from Standard Steel Car Co.

Baltimore & Ohio has ordered seven parlor-cafe cars from Pullman Car & Mfg. Corporation. This road's orders for 3000 freight cars probably will not be placed in two or three weeks.

Union Pacific has ordered 500 automobile cars from Ralston Steel Car Co.

Northern Pacific has ordered 200 flat cars from Pressed Steel Car Co. and will buy 100 stock car underframes in place of the same number of stock cars previously reported. It will build 100 stock cars in its own shops.

Industrial Coal Stocks Higher in April

Total stocks of bituminous coal, in industries in the United States, are reported by the National Association of Purchasing Agents, as of April 1, as representing 32 days' supplies at current rates of consumption. This compares with 28 days' supply on March 1. All of the groups covered showed increases.

Steel mills had supplies for 31 days, against 29; by-product coke plants, for 33 days, in place of 27; railroads, for 27 days, compared with 24; electric and gas utilities, for 57 days, instead of 49; other industries, for 29 days, against 28 a month earlier.

Allegheny Steel and West Penn Merge

Consolidation of the Allegheny Steel Co. and the West Penn Steel Co., both of Brackenridge, Pa., has been completed with the formation of a new company to be known as the Allegheny Steel Co., which will acquire the entire assets and business of both organizations. The new unit will have an annual capacity of 450,000 tons of steel ingots, 250,000 tons of sheets, 24,000 tons of iron and steel castings, and through its subsidiary, the Delaware Seamless Tube Co., Auburn, Pa., 30,000 tons of seamless and lap-welded tubing. It will also be one of the country's largest producers of chrome iron and chrome-nickel iron. The present officers of the old Allegheny company will likely be retained by the new corporation.

Better Locomotive Shipments

WASHINGTON, May 7.—Railroad locomotives to the number of 61 were shipped in April, against 35 in March, making the largest monthly total since March of last year, when 70 locomotives were shipped, according to the Department of Commerce. Of the April shipments, 59 were for domestic use, 57 being steam units, while two steam locomotives were exported.

At the end of April there were unfilled orders for 495 locomotives, of which 419 were steam locomotives for domestic delivery and 52 were steam locomotives for export, the remaining 24 being electric locomotives for domestic account. The total was the largest in more than a year, comparing with only 188 a year ago.

Building Costs Continue at High Levels

Costs of construction in April remained at the March level of 204 (with 1913 = 100), according to the Associated General Contractors of America. Wages, averaged for 12 cities, remained at 226, while contractors' prices for nine basic materials, also in 12 cities, advanced from 189 in March to 190 in April—the highest level for several years. Last year it was 184 in April and lower through the summer. In 1927 it was 180 in April and below that until the following February.

More Electricity Generated by Water-Power in March

Although the total production of electric power in March, as reported by the United States Geological Survey, was lower than in January, the amount produced by water-power was greater. Expressed in millions of kwhr., the March total was 7989, compared with 8241 in January, and 7433 in February. That from water-power was 3139 in March, against 2698 in January, and 2443 in February.

Fuels figured much less in March than in either of the preceding months, accounting for 4850, compared with 5543 in January, and 4990 in February.

Total value of locomotives and parts manufactured in the United States in 1927 amounted to $86,160,670, an increase of 16.5 per cent as compared with $73,946,742 reported for 1925, according to the Bureau of the Census.

Pacific Coast

Orders Placed for 8000 Tons of Plates and Shapes and 1500 Tons of Reinforcing Bars

SAN FRANCISCO, May 4 (*By Air Mail*).—The structural steel shape and plate markets were active during the past week, more than 8000 tons having been placed. Included among the awards were 2250 tons of plates and 2250 tons of shapes for the Pacific Car & Foundry Co., Seattle, and 2500 tons of plates and shapes for flat cars for the Southern Pacific Equipment Co., San Francisco. Bids were also opened this week on 1300 tons of plates for a pipe line in Oakland and on 1200 tons for a siphon for the Belle Fourche project in South Dakota. The price structure is holding well.

Pig Iron.—Some improvement in the rate of foundry operations is reported. No changes in prices have occurred.

Prices per gross ton at San Francisco:

*Utah basic	$25.00 to $26.00
*Utah fdy., sil. 2.75 to 3.25	25.00 to 26.00
**Indian fdy., sil. 2.75 to 3.25	25.00 to 26.00

*Delivered San Francisco.
**Duty paid, f.o.b. cars San Francisco.

Bars.—Business booked this week, totaling about 1500 tons, was the heaviest in seven weeks. Among the larger lettings were 490 tons for a school in San Francisco, placed with W. S. Wetenhall Co.; 400 tons for a cannery in Oakland, taken by Soule Steel Co., and 125 tons for a garage in Seattle, secured by the Northwest Steel Rolling Mills. Pending business is of fair proportions. Out-of-stock prices in the San Francisco and Los Angeles districts continue at 2.30c., base, on carload lots and at 2.60c. on smaller lots. Merchant bar stock is quoted at 2.35c., c.i.f.

Plates.—Included among the bookings this week was 2250 tons of plates for the Pacific Car & Foundry Co., Seattle, 1500 tons of which was placed with the Pacific Coast Steel Co., the rest going to Eastern producers. The Southern Pacific Equipment Co., San Francisco, has placed about 1450 tons with various mills of its 3000-ton inquiry for flat cars, and it is understood that the remainder will be placed shortly. The Western Pipe & Steel Co. was low bidder on 1200 tons for a 96-in. siphon for the Belle Fourche project in South Dakota. Bids were opened this week on 1300 tons for a pipe line in Oakland. Prices hold at about 2.35c., c.i.f.

Shapes.—A fair tonnage of structural shapes was placed this week, including 2250 tons for the Pacific Car & Foundry Co., Seattle, 1500 tons of which was taken by the Pacific Coast Steel Co., the rest going to Eastern producers. The Southern Pacific Equipment Co. also placed 1050 tons of its 2200-ton inquiry for flat cars with Eastern mills. The Consolidated Steel Corporation secured 350 tons for the Willys-Knight factory addition in Los Angeles and 100 tons for a cover for the Hollywood Bowl. Pending business includes 1000 tons for the Fisher Body plant at Seattle and 450 tons for a school in San Francisco. Plain structural material remains firm at 2.35c., c.i.f.

Cast Iron Pipe.—Some improvement in demand for cast iron pipe has developed. The Pacific States Cast Iron Pipe Co. secured 195 tons of 4- and 6-in. class 150 pipe for Vallejo, Cal., and the United States Cast Iron Pipe Co. booked 104 tons of 6- and 8-in. Class 250 pipe for Alhambra, Cal. Bids were opened this week on 254 tons of 4- to 8-in. Class 150 pipe for Arroyo Grande, Cal., and on 104 tons of 4- to 8-in. Class C pipe for Jefferson Park, Daly City, Cal. New calls for pipe include 188 tons of 4- to 10-in. Class C pipe for San Diego, bids on which will be opened May 20 and 239 tons of 2- to 18-in. Class C pipe for San Diego, bids on which will be opened May 27. Southgate, Cal., will open bids on May 7 for 480 tons of 4- to 16-in. Class B pipe, and Great Falls, Mont., will open bids on May 6 for 226 tons of 6- and 8-in. Class B pipe.

Track Material.—The United Commercial Co. was low bidder on 275 tons of 90-lb. T rail for the Oakland Port Commission. Bids have been opened on 344 tons of 75 to 128 lb. T and girder rails for Long Beach, including track spikes, tie plates, frogs and switches.

Warehouse Prices, f.o.b. San Francisco

	Base per Lb.
Plates and struc. shapes	3.15c.
Soft steel bars	3.15c.
Small angles, ¾-in. and over	3.15c.
Small angles, under ¾-in.	3.55c.
Small channels and tees, ¾-in. to 2¾-in.	3.75c.
Spring steel, ¼-in. and thicker	5.00c.
Black sheets (No. 24)	4.90c.
Blue ann'l'd sheets (No. 10)	3.80c.
Galv. sheets (No. 24)	5.30c.
Struct. rivets, ½-in. and larger	5.65c.
Com. wire nails, base per keg	$3.40
Cement c't'd nails, 100 lb. keg	3.40

Birmingham

New Business in Steel Gains and Heavy Operations in May Are Indicated—Pig Iron Quiet

BIRMINGHAM, May 7.—An increase in pig iron bookings last week over those of the week before was due to the placing of orders by a number of the larger plants for May iron. Generally, consumers are covering only their nearby requirements, and the pig iron market may be described as dull. A small amount of iron was sold last week at $15, furnace, for shipment outside of this district, but merchant producers are still quoting $15.50, base, on much of the business originating in this district. Shipments are steady, but are no larger. Some furnaces are not shipping all the iron that is being made. The No. 4 Birmingham furnace of the Sloss-Sheffield Steel & Iron Co. has been blown out, which leaves 17 active stacks, of which eight are on basic, eight on foundry, and one on recarburizing iron.

Prices per gross ton, f.o.b. Birmingham dist. furnaces:

No. 2 fdy., 1.75 to 2.25 sil.	$15.00 to $15.50
No. 1 fdy., 2.25 to 2.75 sil.	15.50 to 16.00
Basic	15.00 to 15.50

Finished Steel.—Expanding business, followed by a gradual increase in operations, was the feature of the market throughout April, and indications are that even heavier production may be expected this month. Last weeks' new business exceeded that of the preceding week. Sheet demand is developing rapidly. Structural shape demand is the strongest in several seasons.

Prices are not an issue in the situation. An order for 2000 tons of structural steel for the tire fabric plant of the Goodyear Tire & Rubber Co. at Rockmart, Ga., is expected this week. The Tennessee company continues with eight active open-hearths at Ensley and eight at Fairfield and the Gulf States Steel Co. has five on at Alabama City.

Cast Iron Pipe.—Plants are working off old orders as new business continues to fall below the output. Only a small volume of inquiry is up for figures, but there are prospects of better demand before the end of May. The American Cast Iron Pipe Co. and the United States Cast Iron Pipe Co. are low bidders on 3300 tons for Detroit. The United States company received the contract for 4300 tons for New Orleans. The National Cast Iron Pipe Co. has booked 700 tons for Del Rio, Tex. New orders of the American Cast Iron Pipe Co. include 200 tons for Bellevue, Tex., 112 tons for Waco, Tex., and 100 tons for Kalispell, Mont. Quotations remain at $37 to $38 for 6-in. and larger sizes.

Coke.—Foundry coke consumers are well covered and little buying is necessary. The price remains at $5.

Old Material.—Sales and inquiries are increasing. No. 1 cast is showing more activity. Quotations are unchanged.

Prices per gross ton, deliv'd Birmingham dist. consumers' yards:

Heavy melting steel	$12.50
Scrap steel rails	13.00
Short shoveling turnings	9.00
Cast iron borings	9.00
Stove plate	13.00
Steel axles	21.00
Iron axles	23.00
No. 1 railroad wrought	$10.00 to 10.50
Rails for rolling	14.00 to 15.00
No. 1 cast	14.00
Tramcar wheels	13.00 to 14.00
Cast iron carwheels	13.00 to 13.50
Cast iron borings, chem	13.50 to 14.00

Boston

Buffalo Pig Iron Sold on an $18.50 Base for Third Quarter —Large Cast Iron Pipe Weak

BOSTON, May 7.—Weakness has appeared in Buffalo pig iron prices. Furnaces which recently obtained $19.50 a ton, furnace, for No. 2X have accepted small tonnages at $19 for third quarter delivery and for deliveries extending into third quarter. This action presumably was based on the reentry of a Buffalo furnace in the market with June and July iron, and renewed activity of a New York State furnace at prices equivalent to $18 a ton, base Buffalo furnace. The Mystic Iron Works has met the reduced Buffalo prices. A foundry which inquired for 2000 tons of No. 1X third quarter iron intimates that possibly only half that quantity will be purchased. The Westinghouse Electric & Mfg. Co., Springfield, Mass., is inquiring for 500 tons, silicon 3.25 to 3.75, for third quarter.

Foundry iron prices per gross ton deliv'd to most New England points:

*Buffalo, sil. 1.75 to 2.25	$23.41 to $23.91
*Buffalo, sil. 2.25 to 2.75	23.91 to 24.41
East. Penn., sil. 1.75 to 2.25	25.15
East. Penn., sil. 2.25 to 2.75	25.65
Va., sil. 1.75 to 2.25	25.21
Va., sil. 2.25 to 2.75	25.71
Ala., sil. 1.75 to 2.25	21.91 to 24.27
Ala., sil. 2.25 to 2.75	22.41 to 24.77

Freight rates: $4.91 all rail from Buffalo; $3.65 from eastern Pennsylvania; $5.21 all rail from Virginia; $6.91 to $8.77 from Alabama.
*All rail rate.

Coke.—Specifications against first half by-product foundry coke contracts hold up well. Current shipments are on a basis of $11 a ton, delivered within a $3.10 freight rate zone.

Warehouse Business.—Demand for warehouse products is spotty and considerably less than it was a month ago. Prices in some New England localities are soft. Local houses have made concessions of $2 a ton on shapes and the other heavy materials. Foreign steel is available usually at prices $1 to $2 a ton under those quoted on domestic rollings, but supplies are gradually growing smaller. The best deliveries foreign steel makers can now guarantee are September and October.

Reinforcing Bars.—Business in all kinds of reinforcing material was practically at a standstill the past week owing to excessive rains, which held up building operations. The movement of material out of stock is said to have been smaller than for any similar period this year. The 1000 tons of reinforcing bars required for a Somerville, Mass., job probably will be closed this week. Rail steel bars are 2.26½c. per lb., base, delivered common Boston freight rate points, and billet steel reinforcing bars 2.66½c. per lb., base, from stock.

Cast Iron Pipe.—Cambridge, Mass., has awarded 300 tons of 6 to 12-in. pipe to R. D. Wood & Co. That foundry was low bidder on 250 tons of 12-in. pipe required by Providence, R. I. Wrentham, Mass., has placed 450 tons of 6-in. pipe with the Warren Foundry & Pipe Co. Wayland, Mass., is taking bids on 950 to 1000 tons of 6 and 8-in. pipe. Some low prices are being quoted on 12-in. and larger dimensions, concessions running as high as $6 a ton. Domestic foundries are making the low prices. Quotations made openly are: 4 in., $47.60 a ton, delivered common Boston freight rate points; 6 to 12 in., $43.10 to $44.10; 16 to 20 in., $42.10 to $43.10. A $3 differential is asked on Class A and gas pipe.

Old Material.—Consumers are making offers for old material at prices below current market levels, while owners of scrap are still holding off, hoping for higher returns. The actual movement out of New England to consuming points is therefore more or less restricted. The market on chemical borings, rails of all kinds and long bundled skeleton appear softer, and the holding up of shipments of specification pipe has caused some weakness, but quotations on all other materials are steady. Brokers' prices on steel car axles vary widely, ranging from $15.50 to $16 a ton, on cars shipping point, to $18 or $18.50. The Perry, Buxton, Doane Co., Boston, has bought the bulk of the defunct Norton, Taunton & Attleboro Street Railway Corporation, Norton, Mass., for $28,750.

Buying prices per gross ton, f.o.b. Boston rate shipping points:

No. 1 heavy melting steel	$11.75 to $12.00
Scrap T rails	11.50 to 12.00
Scrap girder rails	10.50 to 11.00
No. 1 railroad wrought	12.00 to 12.50
No. 1 yard wrought	9.50 to 10.00
Machine shop turnings	6.75 to 7.00
Cast iron borings (steel works and rolling mill)	6.50 to 6.75
Bundled skeleton, long	9.00 to 10.00
Forged flashings	10.00 to 10.50
Blast furnace boring and turnings	6.00 to 6.25
Forged scrap	9.00 to 9.50
Shafting	14.00 to 14.25
Steel car axles	17.00 to 17.50
Wrought pipe 1 in. in diameter (over 2 ft. long)	10.50 to 11.00
Rails for rolling	12.00 to 12.50
Cast iron borings, chemical	10.00 to 10.25

Prices per gross ton deliv'd consumers' yards:

Textile cast	$14.50 to $15.00
No. 1 machinery cast	16.50 to 17.00
No. 2 machinery cast	14.50 to 15.00
Stove plate	11.50 to 12.00
Railroad malleable	17.50 to 18.00

Warehouse Prices, f.o.b. Boston

	Base per Lb.
Plates	3.365c.
Structural shapes—	
Angles and beams	3.365c.
Tees	3.365c.
Zees	3.465c.
Soft steel bars, small shapes	3.265c.
Flats, hot-rolled	4.15c.
Reinforcing bars	3.265c. to 3.54c.
Iron bars—	
Refined	3.265c.
Best refined	4.60c.
Norway rounds	6.60c.
Norway squares and flats	7.10c.
Spring steel—	
Open-hearth	5.00c. to 10.00c.
Crucible	12.00c.
Tie steel	4.50c. to 4.75c.
Bands	4.015c. to 5.00c.
Hoop steel	5.50c. to 6.00c.
Cold-rolled steel—	
Rounds and hex	*3.55c. to 5.55c.
Spares and flats	*4.05c. to 7.05c.
Toe calk steel	6.00c.
Rivets, structural or boiler	4.50c.

	Per Cent Off List
Machine bolts	50 and 5
Carriage bolts	50 and 5
Lag screws	50 and 5
Hot-pressed nuts	50 and 5
Cold-punched nuts	50 and 5
Stove bolts	70 and 10

*Including quantity differentials.

Buffalo

Pig Iron Weakens for Outside Shipments—Steel Mills Still Going Strong—Scrap Market Easier

BUFFALO, May 7.—The principal sale of pig iron the past week was 1000 tons of foundry to a New York State melter. Other iron placed with Buffalo furnaces was in much smaller lots. Producers expect that many foundries in the East will come into the market early in June for third quarter delivery. The General Electric Co. is inquiring for 1300 tons of foundry for its Elmira plant and there is an inquiry for 300 to 500 tons of foundry and another for 200 to 300 tons. The price in the district is firm at $19.50, base, but for outside shipment the $18.50 base has been driven down to $18 on some competition. There has been as yet no barge movement of iron because of high water in the canal.

Prices per gross ton, f.o.b. furnace:

No. 2 fdy., sil. 1.75 to 2.25	$18.50 to $19.50
No. 2X fdy., sil. 2.25 to 2.75	19.00 to 20.00
No. 1 fdy., sil. 2.75 to 3.25	20.00 to 21.00
Malleable, sil. up to 3.25	19.00 to 20.00
Basic	17.50 to 18.50
Lake Superior charcoal	27.28

Finished Iron and Steel.—The demand for bars, shapes, plates and sheets is brisk. Automobile factories, continuing in strong production, are pushing the body sheet output to the limit. Nut and bolt interests report good business, and wire is moving well. No large structural jobs have been let, but there is a steady flow of small business in fabricated shapes. All mills in this district are working close to capacity.

Old Material.—An easier condition prevails in this market. The larger

Warehouse Prices, f.o.b. Buffalo

	Base per Lb.
Plates and struc. shapes	3.40c.
Soft steel bars	3.30c.
Reinforcing bars	2.75c.
Cold-fin. flats, sq. and hex	4.45c.
Rounds	3.95c.
Cold-rolled strip steel	5.35c.
Black sheets (No. 24)	4.20c.
Galv. sheets (No. 24)	4.85c.
Blue ann'l'd sheets (No. 10)	3.50c.
Com. wire nails, base per keg	$3.60
Black wire, base per 100 lb	3.75

consumers remain out of the market as far as local buying is concerned. A few sales of No. 1 heavy melting steel to the smaller consumers have been made at $17.25 to $17.50. Deliveries on some of the old lower-priced orders for No. 1 steel are slow. Dealers supplying the No. 2 steel on old orders at $14.75 are paying $14.25 to $14.50. There have been a few sales of No. 1 machinery cast at $16.50 to $16.75, but the principal consumer remains out of the market. The only sign of real activity is in the specialties. Considerable stove plate is being thrown on the market, but there is no demand for it, in sharp contrast to a few months ago when dealers were paying as much as $1 over the selling price to obtain tonnage. A large consumer here is moving two boatloads of scrap a week from Detroit and will probably increase this to four cargoes a week in a short time.

Prices per gross ton, f.o.b. Buffalo consumers' plants:

Basic Open-Hearth Grades	
No. 1 heavy melting steel	$17.25 to $17.50
No. 2 heavy melting steel	14.75 to 15.00
Scrap rails	17.00 to 18.00
Hydraul. comp. sheets	14.75 to 15.00
Hand bundled sheets	12.00 to 12.50
Drop forge flashings	14.00 to 14.50
No. 1 busheling	16.50 to 16.75
Hvy. steel axle turnings	14.00 to 14.50
Machine shop turnings	7.75 to 8.00
No. 1 railroad wrought	13.50 to 14.00
Acid Open-Hearth	
Knuckles and couplers	19.50 to 20.00
Coil and leaf springs	19.50 to 20.00
Rolled steel wheels	19.50 to 20.00
Low phos. billet and bloom ends	20.00 to 20.50
Electric Furnace Grades	
Short. shov. steel turnings	12.00 to 12.50
Blast Furnace Grades	
Short mixed borings and turnings	11.00 to 12.00
Cast iron borings	11.00 to 12.00
No. 2 busheling	10.00 to 10.50
Rolling Mill Grades	
Steel car axles	18.75 to 19.25
Iron axles	21.00 to 22.00
Cupola Grades	
No 1 machinery cast	16.00 to 17.00
Stove plate	13.50 to 14.00
Locomotive grate bars	13.50 to 14.00
Steel rails, 3 ft. and under	20.50 to 21.00
Cast iron carwheels	14.00 to 14.50
Malleable Grades	
Industrial	19.75 to 20.00
Railroad	19.75 to 20.00
Agricultural	19.50 to 20.00
Special Grades	
Chemical borings	12.50 to 13.50

Canada

Railroad Plans Extensive Betterment

TORONTO, ONT., May 7.—Parliamentary sanction for the issue of guaranteed securities amounting to $53,750,000 is sought by the Canadian National Railways. The estimates provide for an outlay of $35,750,000 for general additions and improvements, while prospective equipment payments amount to $6,313,400. The program will include the laying of heavy rail, extension of freight and passenger yard facilities, new bridges, new hotels, new ships for the Pacific coastal service and numerous other items. Continuing the policy of laying 100-lb. rail on the main line between Halifax, N. S., and Vancouver, B. C., this work, which has been under way in the past year, will proceed in the Atlantic, Central and Western regions. In all, 916 miles of new heavy rail track is to be provided, requiring the purchase of 169,000 tons of rails, with necessary rail fastenings.

Pig Iron.—The spot demand for merchant iron is holding at a satisfactory level, and there has been a better forward buying. Hand-to-mouth buyers are entering the market at frequent intervals, but most of the sales are in car lots.

Prices per gross ton:

Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75	$24.10 to $24.60
No. 2 fdy., sil. 1.75 to 2.25	24.10 to 24.60
Malleable	24.10 to 24.60
Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75	$25.50 to $26.00
No. 2 fdy., sil. 1.75 to 2.25	25.50 to 26.00
Malleable	25.50 to 26.00
Basic	24.50 to 25.00
Imported Iron, Montreal Warehouse	
Summerlee	$33.50
Carron	33.00

Structural Steels.—Spring building programs are producing a steady demand for steel. The Ontario Government is reported to be considering the erection of a new $7,000,000 steel bridge over the Niagara River. The Canadian National Railways may build a new terminal at Montreal, for which 15,000 to 20,000 tons of steel would be required. Two new bridges in the Montreal district, for which plans are being prepared, will call for 5000 to 8000 tons. Other prospective demand includes about 8000 tons for a 26-story building on Richmond Street, Toronto, to be erected in the early future by Henry Falk; 2000 tons for a customs house at Toronto; 3000 tons for Lachapelle bridge at Montreal.

Old Material.—A few price changes are reported by local dealers. Stove plate, formerly quoted by Toronto dealers at $9.50 per net ton, is now being purchased at $12; standard car wheels have been advanced $1 per ton to $15, as offered by local dealers. Buying prices for heavy melting steel have advanced 50c. to $10 per gross ton, Toronto. Other changes of 50c. to $1 per ton have also been made in local price lists. Montreal quotations are strong, but unchanged.

Dea'ers' buying prices:

	Per Gross Ton	
	Toronto	Montreal
Heavy melting steel	$10.00	$8.50
Rails, scrap	11.00	9.00
No. 1 wrought	10.00	12.00
Machine shop turnings	7.50	5.00
Boiler plate	7.50	6.00
Heavy axle turnings	8.00	7.50
Cast borings	7.50	5.00
Steel turnings	7.50	6.50
Wrought pipe	6.00	6.00
Steel axles	15.00	20.00
Axles, wrought iron	17.00	22.00
No. 1 machinery cast	....	17.00
Stove plate	....	13.00
Standard carwheels	....	16.00
Malleable	....	13.00
	Per Net Ton	
No. 1 mach'ry cast	$16.00	....
Stove plate	12.00	....
Standard carwheels	15.00	....
Malleable scrap	14.00	....

St. Louis

Building Operations Stopped by Strike—Car Builders Buying Plates—Pig Iron Quiet—Scrap Weak

ST. LOUIS, May 7.—The pig iron market is quiet. While melt is said to be holding up well and shipments are undiminished, buying is light, largely because foundries already have committed themselves for their requirements for the remainder of this quarter. Sales of the St. Louis Gas & Coke Corporation for the week amounted to less than 2500 tons, including 500 tons each to a Tri-Cities melter and a northern Illinois melter; 300 tons to a Kansas foundry; 300 tons each to a Quincy specialty maker and a Kansas foundry; 200 tons each to a local stove plant and a local job foundry; all foundry iron. No Southern iron sales of consequence were made. Prices are unchanged.

Prices per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25, f.o.b. Granite City, Ill.	$20.00
Malleable, f.o.b. Granite City	20.50
N'th'n No. 2 fdy., deliv'd St. Louis	22.16
Southern No. 2 fdy., deliv'd	$19.42 to 19.92
Northern malleable, deliv'd	22.16
Northern basic, deliv'd	22.16

Freight rates: 75c. (average) Granite City to St. Louis; $2.16 from Chicago; $4.42 from Birmingham.

Coke.—Foundry and furnace coke continue in good demand, with shipments against contracts fully up to schedules. Demand for domestic coke has fallen off considerably with the arrival of warm weather. Prices are unchanged.

Finished Iron and Steel.—Building operations in St. Louis, which have been quiet for several months, were brought to a standstill May 1 by a strike for higher wages by more than 4500 building trades workers. No new business is being placed with fabricators or reinforcing bar interests. The Granite City Steel Co. reports a large demand for plates from car builders. This company's unfilled tonnage of galvanized sheets is eight times that at this time last year. A slight improvement is reported in tin plate specifications from can manufacturers. Warehouse business

Warehouse Prices, f.o.b. St. Louis

	Base per Lb.
Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.15c.
Cold-fin. rounds, shafting, screw stock	3.75c.
Black sheets (No. 24)	4.25c.
Galv. sheets (No. 24)	5.10c.
Blue ann'l'd sheets (No. 10)	3.45c.
Black corrug. sheets (No. 24)	4.30c.
Galv. corrug. sheets	5.15c.
Structural rivets	3.95c.
Boiler rivets	3.95c.
	Per Cent Off List
Tank rivets, 7/8-in. and smaller, 100 lb. or more	65
Less than 100 lb	60
Machine bolts	60
Carriage bolts	60
Lag screws	60
Hot-pressed, nuts, sq., blank or tapped, 200 lb. or more	60
Less than 200 lb	50
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more	60
Less than 200 lb	50

for April was about 15 per cent in excess of March volume, the greatest demand having been for plates and structurals.

Old Material.—While there were few price changes in the old material list during the week, the market continues weak, owing to heavy shipments by railroads and country dealers. Consumers continue to buy in normal quantities. Railroad lists: Baltimore & Ohio, 15,990 tons; Pennsylvania, 49,325 tons; Santa Fe, 5510 tons; and Frisco lines, 1000 tons miscellaneous scrap and 21 carloads.

Dealers' buying prices per gross ton, f.o.b. St. Louis district:

No. 1 heavy melting or shoveling steel	$13.50 to $14.00
No. 2 heavy melting or shoveling steel	13.00 to 13.50
No. 1 locomotive tires	15.00 to 15.50
Miscel. stand.-sec. rails including frogs, switches and guards, cut apart	15.00 to 15.50
Railroad springs	17.00 to 17.50
Bundled sheets	10.00 to 10.50
No. 2 railroad wrought	13.50 to 14.00
No. 1 busheling	10.00 to 10.50
Cast iron borings and shoveling turnings	9.50 to 10.00
Iron rails	15.00 to 15.50
Rails for rolling	15.50 to 16.00
Machine shop turnings	8.00 to 8.50
Heavy turnings	10.00 to 10.50
Steel car axles	19.00 to 19.50
Iron car axles	26.50 to 27.00
Wrot. iron bars and trans.	22.00 to 22.50
No. 1 railroad wrought	13.50 to 14.00
Steel rails, less than 3 ft.	16.50 to 17.00
Steel angle bars	14.50 to 15.00
Cast iron carwheels	15.00 to 15.50
No. 1 machinery cast	15.50 to 16.00
Railroad malleable	16.00 to 16.50
No. 1 railroad cast	15.00 to 15.50
Stove plate	13.25 to 13.75
Agricult. malleable	15.00 to 15.50
Relay. rails, 60 lb. and under	20.50 to 23.50
Relay. rails, 70 lb. and over	26.50 to 29.00

The Rainey-Wood Coke Co. has contracted with the Koppers Construction Co. for a battery of by-product coke ovens consisting of 41 Becker type ovens. The new work will include three Koppers gas producers for underfiring the ovens. The 41 ovens will have a daily coal carbonizing capacity when operating under normal conditions of approximately 770 net tons of coal. When underfired with producer gas there will be a gas output of approximately 8,200,000 cu. ft. of coke oven gas per day.

Warehouse Prices, f.o.b. Cincinnati

	Base per Lb.
Plates and struc. shapes	3.40c.
Bars, soft steel or iron	3.30c.
New billet reinforc. bars	3.15c.
Rail steel reinforc. bars	3.00c.
Hoops	4.05c.
Bands	3.50c.
Cold-fin. rounds and hex	3.85c.
Squares	4.35c.
Black sheets (No. 24)	4.05c.
Galvanized sheets (No. 24)	4.90c.
Blue ann'l'd sheets (No. 10)	3.45c.
Structural rivets	3.85c.
Small rivets	65 per cent off list
No. 9 ann'l'd wire, per 100 lb.	$3.00
Com. wire nails, base per keg	2.95
Cement c't'd nails, base 100 lb. keg	2.95
Chain, per 100 lb	8.75
	Net per 100 Ft.
Lap-weld steel boiler tubes, 2-in.	$16.00
4-in.	33.00
Seamless steel boiler tubes, 2-in.	17.00
4-in.	34.00

Cincinnati

Sheet Backlog of Leading Producer Drops 10 Per Cent, but Full Operation Until July Is Assured

CINCINNATI, May 7.—Pig iron consumers continue to show a lack of interest in third quarter requirements and are confining purchases to small fill-in tonnages. Prices of Northern foundry iron are firm, Northern Ohio furnaces adhering strictly to $18.50, furnace, with full silicon differentials. At least two Southern producers are declining to accept business under $15.50, Birmingham, and are reported to be curtailing operations rather than dip under that figure. Other makers are said to be willing to book orders at $15. Little Southern iron has been sold in the Ohio River territory in the past week. Jackson County silvery iron is quiét but steady at $26, furnace, for 8 per cent.

Prices per gross ton, deliv'd Cincinnati:

So. Ohio fdy., sil. 1.75 to 2.25	$20.39 to $20.89
Ala. fdy., sil. 1.75 to 2.25	18.69 to 19.19
Ala. fdy., sil. 2.25 to 2.75	19.19
Tenn. fdy., sil. 1.75 to 2.25	19.19
S'th'n Ohio silvery, 8 per cent	27.89 to 28.89

Freight rates, $1.89 from Ironton and Jackson, Ohio; $3.69 from Birmingham.

Coke.—Movement of by-product foundry coke has been well sustained. Domestic grades are fairly active. The price of the former is unchanged at $10.05, delivered Cincinnati. Wise County and New River beehive foundry coke is being taken by users at a steady rate.

Finished Steel.—Sheet steel bookings have been of substantial volume, but have fallen off slightly in the past week. The unfilled tonnage of a large district producer has declined more than 10 per cent since April 1. However, backlogs still are large and assure a continuation of present operations at full capacity in all units until July. Prices are firm. An announcement of third quarter quotations is expected within the next week. Demand for wire goods, especially common wire nails and fencing, has been brisk. An Ohio River mill is quoting common wire nails at $2.69 per keg, delivered Cincinnati.

Warehouse Business.—Local jobbers have advanced black and galvanized sheets $3 a ton, effective May 3. Irregularities continue in common wire nails, which are being sold by some companies at less than $2.95 per keg. Otherwise, prices are firm and unchanged.

Old Material.—Although heavy melting steel has dropped 25c. a ton, prices of other grades have not been disturbed. Borings and turnings are slightly weaker and cast iron grades are sluggish. However, dealers are holding stocks for a possible rise, and those with short orders are having difficulty in covering requirements. Consumption of malleable scrap is heavy and little is available. The Pennsylvania has a list totaling 49,300 tons closing this week.

Dealers' buying prices per gross ton, f.o.b. cars, Cincinnati:

Heavy melting steel	$13.00 to $13.50
Scrap rails for melting	13.75 to 14.25
Loose sheet clippings	9.50 to 10.00
Bundled sheets	10.50 to 11.00
Cast iron borings	9.00 to 9.50
Machine shop turnings	8.50 to 9.00
No. 1 busheling	10.50 to 11.00
No. 2 busheling	6.75 to 7.00
Rails for rolling	14.50 to 15.00
No. 1 locomotive tires	14.25 to 14.75
No. 2 railroad wrought	13.00 to 13.50
Short rails	18.50 to 19.00
Cast iron carwheels	12.75 to 13.25
No. 1 machinery cast	19.25 to 19.75
No. 1 railroad cast	15.25 to 15.75
Burnt cast	10.50 to 11.00
Stove plate	10.50 to 11.00
Brake shoes	10.50 to 11.00
Railroad malleable	15.50 to 16.00
Agricultural malleable	14.50 to 15.00

Detroit

Some Automobile Companies Break Records in April—May Production Started at an Undiminished Rate

DETROIT, May 7.—The demand for metal and metal products in this district directly reflects the continued prosperity of the automotive manufacturers. Although reports for April are not complete, it appears that all-time records were broken last month by two of the automobile manufacturers, and April records were exceeded by two others.

Shipments of Cadillac and La Salle cars in April increased approximately 15 per cent over the April figure of 1928. Shipments for the first four months of this year totaled 14,159 units, with retail deliveries showing a considerable improvement over those of last year.

Production of Chevrolet Motor Co., both cars and trucks for April, amounted to 157,134 units—an increase over March production, this year, and April, 1928, production.

April showed a new high record in the output of Graham-Paige units, with a total of 11,550. This is an increase of 1940 over March.

April was the largest month in the history of the Hudson Motor Car Co.; 44,447 Hudson and Essex cars were shipped. Total shipments so far this year exceed those of the same period in 1928 by 33,058 units. This company enters May with a schedule of 1900 units per day, and with distributers calling for 5000 more units this month than the company will be able to produce. Total shipments for the second quarter are now estimated at between 120,000 and 125,000 units.

Hupp Motor Car Corporation shipped 6118 cars in April and has

started May with unfilled orders for 2456.

Oakland Motor Car Co. set up a new record for April with a production of 36,384 units, an increase over the previous month and over April, 1928. The present rate of production will be maintained throughout May.

Production at the Olds Motor Works is scheduled at 17,000 units for May.

Reo Motor Car Co. also established a new April record, with 5716 units. This figure is greater than the production in March, this year, or that of April, 1928.

All departments of the Hayes Body Corporation are now operating on a 5½-day week, with night shifts in several of the departments; 650 Chrysler bodies a day are being turned out in the Grand Rapids plant; 300 Marmon and Roosevelt bodies in the Indianapolis plant, and about 70 bodies a day in the Ionia plant.

Three additional open-hearth furnaces have recently been put into operation at the Ford River Rouge plant, which brings the total up to 10, and gives this plant a capacity of 50,000 tons of alloy steel ingots a month.

Old Material.—No sales of size have have been recorded in the district during the past week and prices remain the same as quoted last week, generally shading toward the lower limit of the range.

Dealers' buying prices per gross ton, f.o.b. cars, Detroit:

Hvy. melting and shov. steel	$14.00 to $14.50
Borings and short turnings	9.00 to 9.50
Long turnings	7.75 to 8.25
No. 1 machinery cast	14.50 to 15.00
Automobile cast	16.00 to 16.50
Hydraul. comp. sheets	13.75 to 14.25
Stove plate	9.50 to 10.00
No. 1 busheling	11.00 to 11.50
Sheet clippings	9.50 to 10.00
Flashings	12.00 to 12.50

Less Coal Mined in April

Bituminous coal mined in the United States in April is reported by the Bureau of Mines at 36,871,000 net tons, a reduction of 6.3 per cent from the 39,347,000 tons in March. It was, however, nearly 15 per cent above the 32,188,000 tons raised in April, 1928.

Anthracite output showed a gain in April, reaching 6,386,000 tons, against 5,044,000 tons in March. Last year the total in April was 6,909,000 tons.

Beehive coke fell off in April to 464,700 tons, from 533,500 tons in March, but was far above the total of 377,500 tons for April, 1928.

For May-June, tonnage rates paid boilers and finishing hands in mid-Western mills continue unchanged from the March-April rates, following the bi-monthly examination of sales sheets. On bar iron shipped by mid-Western mills for the 60 days ended April 20, an average price of $2 per 100 lb. applied, which is the same as for the preceding 60-day period. Puddlers receive $11.80 per ton under existing arrangements.

Employee Medical Service Economically Important

Medical service to employees is desirable from an economic as well as a social standpoint, according to an exhaustive study recently made by the National Metal Trades Association. It was found that employee medical service is invaluable in plants where accidents or absenteeism is high, or where group insurance policies, or employees' benefit plans or relief associations are in operation. Such service is not only a direct contribution to the well-being of the individual employee, but also tends to lessen demand for State legislation in favor of compulsory health insurance and similar measures.

The careful selection of medical personnel is of paramount importance. Properly qualified and well paid doctors and nurses will not only operate the medical department successfully, but will create valuable by-products in the good will, confidence and understanding of the employees. The carefully selected physician will have many of the attributes of a personnel manager, and in some large and medium-size plants will probably fill that position admirably. Small plants would, in many cases, be well advised to organize themselves in groups, so that each may enjoy the services of a physician and nurse, even though it be on a part-time basis.

A physical examination by a physician of all new employees and sometimes old employees should be included as a part of any program of employee medical service. Periodic examination of major executives is especially important.

German Machinery Penetrates Eastern Europe

WASHINGTON, May 7.—Exports of machinery from Germany to Eastern Europe rose to 231,700,000 reichsmarks (a reichsmark equals $0.238) in 1928 from 69,900,000 m. in 1924, according to a report from vice-consul H. L. Franklin, made public by the Department of Commerce. The relative importance of the Eastern European market as an outlet for German machinery has been constantly increasing, this territory having taken almost 21 per cent of total German machinery exports in 1928, as against 15 per cent in 1924; 14 per cent in 1925; 14.5 per cent in 1926 and about 21 per cent in 1927. Germany's best customer in Eastern Europe is Russia, which took German machinery to the value of 131,700,000 m. in 1928. Poland's purchases amounted to 60,700,000 m., while those made by Finland and Danzig were valued at 15,800,000 m. and 11,800,000 m. respectively.

Next to the unclassified items, which are not susceptible of separate consideration, machine tools hold first place in German machinery exports to Eastern Europe, the value of this class of exports to that market in 1928 having been 21,750,000 m. This represented a decline of 4,440,000 m. from 1927, owing principally to a 23 per cent drop in exports to Russia. Textile machinery also forms an important item of exports from Germany to Eastern Europe, the 1928 value having been 26,410,000 m. Poland is Germany's best customer for this class of equipment. German shipments of other machinery items, with the exception of electrical machinery, showed an increase in 1928 of 31 per cent over the preceding year.

Mr. Franklin reported that the sharp increases in exports of German machinery to Eastern Europe have been materially aided by long-term credits and comparatively cheap prices. The Germans are still able to maintain their credit inducements. But growing costs of production, including increased wages and higher prices for raw material, are said to be forcing them to raise their selling prices. This is held to be weakening their competitive advantage in the Eastern European field and to be facilitating more effective competition from American and other sources.

Metallurgical Uses of Limestone

"Metallurgical Limestone" is the title of Bulletin No. 299 of the United States Bureau of Mines, which discusses problems in the production and utilization of this material. The author is Oliver Bowles, who covers in 40 pages the origin and character of limestone, its varieties and physical characteristics and its distribution and transportation. Nearly 20 pages are given up to uses of limestone as a flux in the blast furnace, in the basic open-hearth and in nonferrous metallurgy. Copies of the pamphlet may be obtained from the Government Printing Office at 10c. each.

The stoker-bin system of pulverized fuel firing will be discussed at a meeting of the Boston section of the American Society of Mechanical Engineers at the Engineers' Club, that city, on the evening of May 15. The speakers are: D. J. Mosshart, assistant chief engineer of the stoker department of the Westinghouse Electric & Mfg. Co., Henry Kreisinger, research engineer, Combustion Engineering Corporation, and Ollison Craig, consulting engineer, Riley Stoker Corporation.

Contract for Steinbart burners for all stoves and boilers for three blast furnaces at the Anzan Steel Works of the South Manchuria Railway Co. has been awarded to the American Heat Economy Bureau, Inc., Pittsburgh. Altogether 22 Steinbart burners will be installed.

Non-Ferrous Metal Markets

Copper Still Quiet and Firm, Tin Moderately Active and Steady, Lead Dull and Unchanged, Zinc Inactive and Easy

NEW YORK, May 7.

Copper. — Demand continues very light, but prices are firm. Custom smelters are taking practically all of the domestic business offered and are understood to be selling the bulk of their intake. Primary producers are entirely out of the market. The trouble in arriving at a settlement on reparations in Paris has seriously slowed up foreign buying. Yesterday and today, however, with prospects somewhat brighter at Paris, buying has been better. Yesterday about 1500 tons was sold and today nearly 1200 tons. It is believed that any improvement in the market as a whole must come from abroad. It is known that melters over there will soon need to buy more metal. Consumers in this country are well covered through July and probably will not make purchases until they have to. It is the opinion of one well-informed seller that the market here may ultimately return to hand-to-mouth buying. Electrolytic copper is still quoted at 18c., delivered in the Connecticut Valley, with Copper Exporters, Inc., still pegged at 18.30c., usual European ports. Lake copper is only moderately active at 18c. to 18.12½c., delivered.

Tin.—Sales of Straits tin for the week ended Saturday, May 4, were 900 to 1000 tons. Consumers were the principal buyers, though dealers were a little more active. As a rule consumers are not buying on a strong market. Yesterday the market was very quiet, only about 100 tons changing hands, and today conditions were a little better, with 150 to 200 tons sold. Spot Straits tin is quoted today at 44c., New York. Prices in London still hover around £200 per ton, or less, and quotations today were as follows: Spot standard, £197 15s.; future standard, £200 2s. 6d., and spot Straits, £199 5s., all about the same as a week ago. The Singapore price today was £202 5s. Sales in the Far East have been very heavy the past week, totaling 1745 tons, including the 250 tons sold today. Statistics for April show total shipments to have been 12,739 tons, of which 8950 tons was from the Straits. Deliveries into consumption in the United States were very large at 8435 tons, with the total for the first four months a record. Total world deliveries last month

THE WEEK'S PRICES. CENTS PER POUND FOR EARLY DELIVERY

	May 7	May 6	May 4	May 3	May 2	May 1
Lake copper, New York	18.12½	18.12½	18.12½	18.12½	18.12½	18.12½
Electrolytic copper, N. Y.*	17.75	17.75	17.75	17.75	17.75	17.75
Straits tin, spot, N. Y.	44.00	44.00	....	43.87½	43.75	43.87½
Zinc, East St. Louis	6.60	6.60	6.60	6.60	6.60	6.60
Zinc, New York	6.95	6.95	6.95	6.95	6.95	6.95
Lead, St. Louis	6.80	6.80	6.80	6.80	6.80	6.80
Lead, New York	7.00	7.00	7.00	7.00	7.00	7.00

*Refinery quotation: price ¼c. higher delivered in the Connecticut Valley.

Rolled Products

Prices on rolled non-ferrous products are unchanged from those prevailing one week ago.

List Prices, Per Lb., f.o.b. Mill

On Copper and Brass Products, Freight up to 75c. per 100 Lb. Allowed on Shipments of 500 Lb. or Over

Sheets—

High brass	23.25c.
Copper, hot rolled	26.75c.
Zinc	10.25c.
Lead (full sheets)	11.00c. to 11.25c.

Seamless Tubes—

High brass	28.25c.
Copper	29.25c.

Rods—

High brass	21.25c.
Naval brass	24.00c.

Wire—

Copper	19.87½c.
High brass	23.75c.
Copper in Rolls	26.75c.
Brazed Brass Tubing	30.87½c.

Aluminum Products in Ton Lots

The carload freight rate is allowed to destinations east of Mississippi River and also to St. Louis on shipments to points west of that river.

Sheets, 0 to 10 gage, 3 to 30 in. wide	33.00c.
Tubes, base	42.00c.
Machine rods	34.00c.

Chicago Warehouse

(Prices Cover Trucking to Customers' Doors in City Limits)

Sheets—	Base per Lb.
High brass	23.25c.
Copper, hot rolled	27.75c.
Copper, cold rolled, 14 oz. and heavier	30.00c.
Zinc	10.00c.
Lead, wide	11.90c.
Seamless Tubes—	
Brass	28.25c.
Copper	29.25c.
Brass Rods	21.25c.
Brazed Brass Tubes	31.00c.

New York or Cleveland Warehouse

Delivered Prices, Base Per Lb.

Sheets—	
High brass	21.12½c. to 22.12½c.
Copper, hot rolled, base sizes	27.75c. to 28.75c.
Copper, cold rolled, 14 oz. and heavier, base sizes	30.00c. to 31.00c.
Seamless Tubes—	
Brass	26.00c. to 27.00c.
Copper	29.12½c. to 30.12½c.
Brazed Brass Tubes	29.12½c. to 30.12½c.
Brass Rods	18.87½c. to 19.87½c.

New York Warehouse

Delivered Prices, Base Per Lb.

Zinc sheets (No. 9), casks	10.50c. to 11.00c.
Zinc sheets, open	11.50c. to 12.00c.

Metals from New York Warehouse

Delivered Prices Per Lb.

Tin, Straits pig	46.00c. to 47.00c.
Tin, bar	48.00c. to 49.00c.
Copper, Lake	19.50c.
Copper, electrolytic	19.25c.
Copper, casting	19.00c.
Zinc, slab	7.75c. to 8.25c.
Lead, American pig	7.75c. to 8.25c.
Lead, bar	9.75c. to 10.25c.
Antimony, Asiatic	11.00c. to 11.50c.
Aluminum No. 1 ingots for remelting (guaranteed over 99% pure)	25.00c. to 26.00c.
Alum. ingots, No. 12 alloy,	24.00c. to 25.00c.
Babbitt metal, commercial grade,	30.00c. to 40.00c.
Solder, ½ and ½	29.50c. to 30.50c.

Metals from Cleveland Warehouse

Delivered Prices Per Lb.

Tin, Straits pig	48.75c.
Tin, bar	50.75c.
Copper, Lake	19.50c.
Copper, electrolytic	19.25c.
Copper, casting	18.75c.
Zinc, slab	7.75c. to 8.00c.
Lead, American pig	7.75c. to 8.00c.
Lead, bar	10.00c.
Antimony, Asiatic	16.00c.
Babbitt metal, medium grade	19.00c.
Babbitt metal, high grade	51.75c.
Solder, ½ and ½	31.50c.

Old Metals, Per Lb., New York

Buying prices represent what large dealers are paying for miscellaneous lots from smaller accumulators and selling prices are those charged customers after the metal has been properly prepared for their uses.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	14.00c.	16.00c.
Copper, hvy. and wire	13.75c.	15.25c.
Copper, light and bottoms	12.00c.	13.50c.
Brass, heavy	8.50c.	9.50c.
Brass, light	7.00c.	8.50c.
Hvy. machine composition	11.25c.	12.50c.
No. 1 yel. brass turnings	9.50c.	11.00c.
No. 1 red brass or compos. turnings	11.00c.	12.00c.
Lead, heavy	5.50c.	6.25c.
Lead, tea	4.75c.	6.00c.
Zinc	4.25c.	5.00c.
Sheet aluminum	14.00c.	16.00c.
Cast aluminum	12.50c.	14.50c.

were 13,018 tons. There was a decrease in the visible supply during April of 279 tons, with the total at the end of the month 26,350 tons. On May 1 the visible supply in the United States was 12,535 tons, of which 8932 tons was afloat.

Lead.—Conditions are but little changed from last week and sales are only moderate. They are mostly for May delivery, with some June sales negotiated. Prices are steady, that of the leading seller at St. Louis being 6.80c., with some metal available from other sources at 6.75c. The quotation of the leading interest continues unchanged at 7c., New York, as its contract price.

Zinc.—Extreme dullness continues and sales are few and far between. A few producers are still adhering to 6.80c., East St. Louis, but the light demand is being taken care of by others at 6.60c., with the statement that 6.55c. in one or two cases can be obtained. Statistics for April, out today, were quite favorable to sellers. They showed a decrease in refined stocks of 3374 tons, and shipments for the month were the largest on record at about 58,000 tons. The price for ore at Joplin was unchanged at $44 per ton on Saturday. Sales were again small at only 6520 tons, the lowest since the middle of September, last year. Stocks on May 4 were 24,910 tons, an increase of about 4000 tons for the week and the largest since Jan. 26. Production for the week was about 13,500 tons.

Antimony.—Chinese metal in a quiet market is a little lower at 9.25c. per lb., for all positions.

Nickel.—Ingot nickel, in wholesale lots, is unchanged at 35c., with shot nickel at 36c. per lb. Cathodes of electrolytic nickel are quoted at 35c. per lb.

Aluminum.—Virgin metal, 98 to 99 per cent pure, is unchanged at 23.90c. per lb., delivered, the published price.

Non-Ferrous Metals at Chicago

CHICAGO, May 7.—Prices for copper, lead, zinc and antimony are lower. Sales of non-ferrous metals are more numerous than last week. The old metal market is quiet.

Prices per lb., in carload lots:

Lake copper, 18.12½c.; tin, 44.62½c.; lead, 6.85c.; zinc, 6.70c.; in less-than-carload lots: antimony, 10.25c. On old metals we quote copper wire, crucible shapes and copper clips, 14.50c.; copper bottoms, 11.50c.; red brass, 11.50c.; yellow brass, 8c.; lead pipe, 4.50c.; zinc, 3.75c.; pewter, No. 1, 24.50c.; tin foil, 26c.; block tin, 36c.; aluminum, 12.87½c.; all being dealers' prices for less-than-carload lots.

Few Changed Rates in New Tariff Bill

(*Concluded from page* 1301)

The present provision confining changes to not more than 50 per cent in reduction or in increase of duties is continued. While the general basis of foreign valuation is continued in assessing duties, the changes made are intended to relieve the rigidity of the present provisions where efforts are made to ascertain whether or not foreign and domestic articles are on a competitive level in the domestic market.

The new measure provides that in the case of the foreign articles, the investigation may start at the landed or import cost, adding such costs as are necessary to place it in a position comparable to that of the competing domestic article. On the other hand, if appropriate, the wholesale selling prices of both domestic and foreign articles, with such adjustments as may be necessary to place them upon the same competitive level, may be used. The Ways and Means Committee found the computation of the transportation costs to be a difficult problem and that an accurate general rule to be applied in all cases cannot be prescribed by Congress without further extensive investigation.

The section on marking the country of origin on imported products was rewritten to allow the Secretary of the Treasury to provide for exceptions to the present strict requirements and to prescribe the manner of marking. Present penalties for failure to comply with marking requirements were left unchanged.

The bill likely will be taken up in the House the latter part of the present week. Its passage by the House, it is believed, will require about three weeks. Present plans of the Finance Committee of the Senate are not to hold general hearings. Should such a program be definitely adopted, final enactment of the measure would likely be greatly hastened.

More Steel Workers and Higher Wages

Wage earners in 204 establishments in the iron and steel industry numbered 278,990 in March, a gain of 1 per cent over the 276,311 in the same plants in February, according to the United States Bureau of Labor Statistics. Total weekly payrolls in these establishments advanced 2 per cent, from $9,037,396 in February, to $9,214,254 in March. Average pay envelopes were 1 per cent heavier in March.

Similarly, in 995 plants in the foundry and machine shop group, employees increased from 265,173 to 273,437, a gain of 3.1 per cent. Weekly payrolls went up 4 per cent, from $8,286,566 to $8,620,539. Average pay envelopes carried nearly 1 per cent more in March.

Structural ironworkers increased 0.6 per cent in number, with 0.1 per cent heavier payrolls. Workers in machine tool plants gained 3.8 per cent in number and 3.1 per cent in total payrolls. Those in stove foundries went up 2.4 per cent, both in number and in payrolls.

Cast iron pipe plants reported 6.3 per cent more employees, but payrolls lighter by 0.6 per cent. Hardware manufacturers had 0.5 per cent more men, but 0.7 per cent smaller payrolls. Those making steam fittings and steam and hot water heating apparatus had 1.9 per cent fewer workers and 2.6 per cent lower payrolls.

About 165,000 employees were covered in the six smaller groups in the two paragraphs next above. The increase over February was a little over 1 per cent, while their payroll totals advanced about 0.4 per cent.

Higher Factory Wages

Average weekly earnings in representative New York (State) factories are reported by the State Industrial Commissioner at $30.35 in March—the highest figure ever attained. The advance over February was 36c., or 1.2 per cent. Only once before was the figure above $30, when $30.12 was reached last December. The March figure was $29.64 in 1928, and $29.78 in 1927, the latter being the highest for any month in that year.

Smaller Immigration Than a Year Ago

WASHINGTON, May 7.—Immigrant aliens to the number of 20,145 were admitted to the United States in March, an increase of 2851 over February, according to the Bureau of Immigration. In the first nine months of the current fiscal year a total of 202,912 immigrants entered the country, or a monthly average of 22,546, compared with 25,552 for the corresponding months of last year.

Of the 202,912 immigrants admitted from July 1 to March 31, the German race contributed 39,268 and the Mexican 31,653. The English were third in the list with 21,816, followed closely by the Irish with 21,066, while the Scotch numbered 15,856, Scandinavian 13,661, Italian 13,342, French 11,849, Hebrew 8985 and Polish 2785. Of the immigrants admitted in March, 4346 were skilled and 1689 were common laborers, while for the nine months the totals were 26,088 and 19,903 respectively.

The Wheeling Steel Corporation, Wheeling, W. Va., had net profit available for dividends in the quarter ended March 31 of $1,795,245. This compares with a profit of $1,024,214 in the corresponding quarter of 1928.

Fabricated Structural Steel

Totaling 27,000 Tons, Awards for the Week Are Among Lowest of the Year—New Projects About 19,000 Tons

AN office building in New York calling for 7000 tons and 5000 tons for Chicago & North Western railroad bridges were the largest awards reported the past week, which with a total of about 27,000 tons ranks among the lowest of the year. Of the 19,000 tons in new projects, 5000 tons is for a power house at Michigan City, Ind.

NEW YORK, 1000 tons, Title Guarantee & Trust Co. building on East Forty-fifth Street, to Bethlehem Fabricators, Inc.

NEW YORK, 1200 tons, Loew Theatre at 175th Street and Broadway, to Hinkle Iron Works.

NEW YORK, 400 tons, bank building, Third Avenue and 149th Street, to George A. Just Co.

NEW YORK, 250 tons, boiler setting at Hell Gate power station, to Post & McCord.

NEW YORK, 600 tons, hotel at 136 West Fifty-fifth Street, to Harris Structural Steel Co.

NEW YORK, 7000 tons, office building, Pine, South and Wall Streets, to Hay Foundry & Iron Works.

NEW YORK, 390 tons, addition to Bloomingdale garage, 410 East Fifty-fourth Street, to Levering & Garrigues.

PORT JEFFERSON, N. Y., 400 tons, St. Charles Hospital, to Lehigh Structural Steel Co.

STATE OF NEW YORK, 100 tons, highway bridges, to American Bridge Co.

READING RAILROAD, 4000 tons, electrification from Philadelphia to Lansdale, to Bethlehem Steel Co.

NEW YORK CENTRAL RAILROAD, 108 tons, Odell Avenue crossing at Yonkers, N. Y., to Phoenix Bridge Co.

CAMDEN, N. J., 400 tons, annex to City Hall, to American Bridge Co.

SCRANTON, PA., 850 tons, Technical High School, to Kellogg Structural Steel Co.

OVERBROOK, PA., 380 tons, building for Raub Supply Co., to an unnamed fabricator.

BUFFALO, 1700 tons, Burgard Vocational School, to McClintic-Marshall Co.

NEW KENSINGTON, PA., 100 tons, building for General Electric Co., to Jones & Laughlin Steel Corporation.

PITTSBURGH, 250 tons, building for Salvation Army, to Jones & Laughlin Steel Corporation.

FINLEYVILLE, PA., 600 tons, viaduct for Pittsburgh & West Virginia Railway Co., to American Bridge Co.

CHICAGO, 800 tons, warehouse for Morton Salt Co., to Mississippi Valley Structural Steel Co.

CHICAGO & NORTHWESTERN, 5000 tons, bridges, to American Bridge Co.

CHICAGO, 460 tons, City State Bank building, to American Bridge Co.

LOS ANGELES, 350 tons, addition to Willys-Knight factory, to Consolidated Steel Corporation.

LOS ANGELES, 100 tons, stage cover, Hollywood Bowl, to Consolidated Steel Corporation.

SAN FRANCISCO, 175 tons, apartment building, Clay and Presidio Streets, to Golden Gate Iron Works.

YAKIMA, WASH., 250 tons, telephone building, to Poole & McGonigle.

Structural Projects Pending

Inquiries for fabricated steel work include the following:

CAMBRIDGE, MASS., 950 tons, two State bridges.

RICHMOND, VT., 450 tons, State bridge.

PENNSYLVANIA RAILROAD, 540 tons, bridges in Indiana, 150 tons, and at Dayton, Ohio, 390 tons; bids in.

PENNSYLVANIA RAILROAD, 1675 tons, power substation for Philadelphia-Trenton electrification; Belmont Iron Works low bidder on galvanized steel, Lehigh Structural Steel Co. low bidder on black.

PENNSYLVANIA RAILROAD, 325 tons, poles and supports for electrification at North Philadelphia; American Bridge Co. low bidder.

SPRING MILLS, PA., 450 tons, factory for Walker Co.

STATE OF NEW YORK, 500 tons, highway bridges.

NEW YORK CENTRAL RAILROAD, 500 tons, for widening Park Avenue, New York.

NEW YORK, 22,500 tons, West Side automobile highway; James Stewart & Co., New York, contractors.

ROCKMART, GA., 2200 tons, tire fabric mill for Goodyear Tire & Rubber Co.

MICHIGAN CITY, IND., 5000 tons, power house.

EVANSVILLE, IND., 700 tons, building for telephone company; Yaeger & Sons, general contractors.

CHICAGO, 400 tons, office building for Indiana Harbor plant of Inland Steel Co.

MILWAUKEE, 2200 tons, building for Milwaukee Gas & Light Co.

TRENTON, MO., 300 tons, bridge for Rock Island Railroad.

ROSITA, MEXICO, 1000 tons, mine mill building.

DENVER, 1200 tons, plates, siphon for Belle Fourche project, South Dakota; Western Pipe & Steel Co., low bidder.

SAN FRANCISCO, 450 tons, Roosevelt School; bids opened.

SAN FRANCISCO, 400 tons, office building, Sansome Street; bids opened.

SEATTLE, 1000 tons, Fisher Body plant; subbids being taken.

Reinforcing Steel

Awards of 6000 Tons Among the Largest for the Year

WITH no tonnages of outstanding size, reinforcing steel awards reported for the week amounted to about 6000 tons, one of the largest totals for the year. New projects on which bids are being submitted call for only 2500 tons. Awards follow:

BROOKLYN, 280 tons, sewer work, to Igoe Brothers.

LONG ISLAND CITY, N. Y., 270 tons, factory for Eppinger Securities Co., to Fireproof Products Co.

GLENS FALLS, N. Y., 300 tons, two sections of New York State highway, to Concrete Steel Co.

STATE OF NEW YORK, 1000 tons of reinforcing mesh, to Wickwire Spencer Steel Corporation.

BEACON, N. Y., 120 tons, for Schoonmaker department store, placed by George Campbell, general contractor, with a Poughkeepsie dealer.

TRENTON, N. J., 500 tons, Trenton Potteries Co., to Truscon Steel Co.

BUFFALO, 1000 tons rail steel bars for warehouses for Sears, Roebuck & Co. at Buffalo, Rochester and Syracuse, to Buffalo Steel Co.

READING, PA., 375 tons, building for Reading Railroad, to Gilmore-Roslyn Steel Co., Philadelphia.

CHICAGO, 100 tons, apartment building at 1301 Astor Street, to American System of Reinforcing.

CHICAGO, 140 tons, apartment building, to Calumet Steel Co. by Callner Construction Co.

CHICAGO, 125 tons, building for University of Chicago, to an unnamed bidder.

CHICAGO, 170 tons, apartment building at 910 Lawrence Avenue, to Inland Steel Co.

EVANSTON, ILL., 150 tons, building for Marshall Field & Co., to an unnamed bidder.

SEATTLE, 125 tons, garage for National Automotive Service Co., to Northwest Steel Rolling Mills.

WENATCHEE, WASH., 100 tons, Medical Dental Building, to Northwest Steel Rolling Mills.

SAN FRANCISCO, 490 tons, school on Arguello Boulevard, to W. S. Wetenhall Co.

SAN FRANCISCO, 100 tons, printing plant on Minna Street, to Pacific Coast Steel Co.

OAKLAND, 400 tons, cannery, Fifty-fourth Avenue, to Soule Steel Co.

LOS ANGELES, 170 tons, apartment building at 848 S. Oxford Street, to unnamed interest.

LOS ANGELES, 103 tons, for city, Specification 1136, to Soule Steel Co.

Reinforcing Bars Pending

Inquiries for reinforcing steel bars include the following:

NEW YORK, 380 tons, West Side elevated highway, first section; general contract let to James Stewart & Co., Inc.

ASBURY PARK, N. J., 100 tons, central heating plant for pavilion group; general contract let to DeRiso Brothers, Inc., Asbury Park.

PHILADELPHIA, 1600 tons, Olney High School.

CHICAGO, 500 tons, warehouse for Coca-Cola Co.; George Thompson, general contractor.

SACRAMENTO, CAL., 180 tons, paving in Santa Clara County; bids May 22.

New Trade Publications

Locomotors.—Railway Locomotor Co., Chicago. Booklet of 20 pages illustrated, describing a type of railroad passenger car propelled by a self-contained oil-fired steam engine of new type. Operation is by one man.

Thermometers.—A. E. Moeller Co., 261 Sumpter Street, Brooklyn. Bulletin 31 of four pages, describing and illustrating a thermometer with a red column back of the mercury as an aid in easy reading of temperatures.

Chromium Plating.—Globe Rustproofing Co., Cleveland, has issued a 16-page pamphlet entitled "Production Plating," describing its facilities for making chromium, cadmium and other plated finishes.

Portable Elevators.—Revolvator Co., 352 Garfield Avenue, Jersey City. Bulletin 33-I describes a new zee-bar construction in building elevating stacking equipment for industrial use.

Diesel Engines.—Busch Sulzer Brothers, St. Louis. Bulletin of eight pages illustrating and describing Diesel engines for power plant use. The sizes illustrated run up to 5200 hp.

Cleveland-Cliffs Plan Announced

Holding Company to Be Formed—Eaton Group Will Put in Shares of Steel Companies

PLANS for the merging of the interests of the Cleveland-Cliffs Iron Co. and those of a group headed by Cyrus S. Eaton of Otis & Co., investment bankers, Cleveland, have been announced in a letter to stockholders of the Cleveland-Cliffs company. This alliance is viewed as a probable step in the merger of a number of steel plants in which the Eaton-Mather interests are important factors and which would include the Cleveland-Cliffs company.

The plan provides for the creation of the Cleveland-Cliffs Corporation, a holding company in which the Cleveland-Cliffs stockholders are to have one-half the capital and the Eaton group the other half. Cleveland-Cliffs stockholders are to receive for each share of their present stock 1¼ shares of no par $5 dividend paying preferred stock of the Cleveland-Cliffs Iron Co., $5 in cash and one share of stock in the holding company. As the Cleveland-Cliffs Iron Co. has 400,000 shares of common stock outstanding, its stockholders will receive 500,000 shares of the new preferred stock in the Cleveland-Cliffs Co., $2,000,000 in cash and 400,000 shares of stock in the holding company. Mr. Eaton and his associates are to acquire the other half of the stock of the holding company by turning over to it a group of agreed-upon steel company stocks having a market value of approximately $40,000,000. The Cleveland-Cliffs stock has a book value of $223 per share, but its market value has been somewhat higher the past few days. A voting trust is to be formed to control the holding company.

Stockholders who approve the plan are to deposit their stock with the Union Trust Co., Cleveland, before June 1 and the plan will be declared operative when ratified by 85 per cent of the stock. In case all the stock is not deposited for exchange the Eaton group will be entitled to reduce correspondingly the stocks it deposits.

A committee consisting of William G. Mather, Samuel Mather, Truman H. Newberry, E. B. Greene, G. G. Wade, S. Livingston Mather, H. A. Raymond, C. G. Heer and William P. Belden, directors of Cleveland-Cliffs company, will supervise all steps to make the plan effective. The present Cleveland-Cliffs management is to remain unchanged.

WILLIAM G. MATHER
President, Cleveland-Cliffs Iron Co.

In a letter to the stockholders, William G. Mather, president of the Cleveland-Cliffs Iron Co., stated that it is expected that the Cleveland-Cliffs Corporation will declare dividends from time to time from its new income derived from the ownership of the common stock of the Cleveland-Cliffs company and the block of steel stocks deposited by the Eaton interests. These dividends will be in addition to the revenue received by the Cleveland-Cliffs stockholders from the preferred stock, which will be equivalent to $6.25 for the present common stock in view of the exchange of 1¼ shares of preferred for each share of present common stock.

Hints at Further Steel Mergers

President Mather in his letter to the Cleveland-Cliffs stockholders said:

"In view of the probability of further mergers among the larger steel companies depending for their ore supplies upon the mines of the Lake Superior country, in which event the market for our products might suffer restriction, it has seemed to your directors desirable that our company place itself in a position to participate in such movements.

"An alliance therefore has been arranged with a strong financial group headed by Cyrus S. Eaton, which owns large blocks of stock in a number of the stronger steel companies, which alliance will, in case we remain independent, help to enlarge our markets for iron ore, or place ourselves in a stronger position in connection with the whole industry.

"It is felt by your officers that such an arrangement is in line with the policy of our company in furthering its relation with ore consuming companies, thus enabling us to enlarge our market and increase the profits of the company.

"I am authorized to say that all of the directors and principal stockholders of the company fully approve this plan, and join me in recommending its adoption and in requesting the prompt deposit of your stock."

Vacation with Pay Given to General Electric Workmen

A new plan whereby factory employees of the General Electric Co. with a record of three years or more of continuous service will receive one week's vacation with pay, and employees with a service record of 10 years or more, two weeks' vacation with pay has been announced by C. C. Chesney, vice-president and chairman of the manufacturing committee of the company.

Absence of more than 30 working days during the calendar year preceding the year of vacation, for all personal reasons, shall be considered a break in employee's regular attendance record and in such case he will receive no vacation.

All reasons will be considered personal reasons, except absence due to layoffs from lack of work, jury duty, military duty and attendance at military training camps. Half days will be cumulative in computing any absence. Saturday forenoon will count as a full day in plants closing at noon. Special consideration may be given in the case of an employee absent on account of prolonged illness or in case of injury sustained while on duty. The vacation season will be from Jan. 1 to Dec. 31.

United Metal Trades of Pacific Northwest

L. C. Anderson, manager, Portland Iron Works, was elected president of the United Metal Trades Association at the twenty-third annual Pacific Northwest convention, recently held at the Multnomah Hotel, Portland, Ore. E. R. Hinton, Olympic Steel Works, is the retiring president. Other new officers elected were: A. S. McIntyre, first vice-president; C. H. Pape, second vice-president; O. R. Rabel, third vice-president; Hobart M. Bird, treasurer; and F. J. Danaher, secretary.

The general opinion of the gathering was that the ensuing months of this year will see a notable expansion of the industry. Ray Smyth, Willamette Iron & Steel Works, was chairman of the entertainment committee for the social affairs. John Wallace, Smith Cannery Machine Works, Seattle, was toastmaster at the banquet.

To Build New Rolling Mills

The Gulf States Steel Co. has awarded a contract to the United Engineering & Foundry Co. for the construction of a new electrically-driven blooming mill at its Alabama City, Ala., works. Bids have been received for new plate and sheet mills, and the contract for these new units is expected to be let this week.

PERSONAL

CHARLES R. ROBINSON, vice-president in charge of railroad sales for the Inland Steel Co., has been elected a member of the board of directors, succeeding SAMUEL DEUTSCH, deceased. Mr. Robinson first joined the sales department of the Inland Steel Co. in 1904. In 1908 he went with the Lackawanna Steel Co., Buffalo, as general manager of sales, later becoming vice-president in charge of sales. He returned to the Inland Steel Co. in 1922 in his present capacity as vice-president. JOSEPH L. BLOCK, FRANK R. MEYER, JR., and ALBERT C. ROETH have been elected vice-presidents.

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DAVID A. CRAWFORD, who has been executive vice-president of the Pullman Co., has been elected president, succeeding the late EDWARD F. CARRY. He was born in St. Louis and attended the University of Alabama and the University of Wisconsin. Mr. Crawford began his business career as secretary to Mr. Carry, when the latter was president of the American Car & Foundry Co., and was elected vice-president of the Haskell & Barker Car Co. when Mr. Carry became its president. Mr. Crawford went with Mr. Carry to the Pullman Co. in 1922.

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L. E. YENTZER, for 12 years assistant works manager in charge of operations for the Calumet Steel Co., Chicago, has been made general works manager, succeeding LEE H. HOOK, deceased.

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H. L. WANDERMAN, for a number of years with E. D. Giberson & Co., New York, recently resigned and has established an office at 1440 Broadway, where he will specialize in the sale of tubular products.

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H. P. DAVIS, who has been vice-president in charge of manufacturing operations for the Westinghouse Electric & Mfg. Co., East Pittsburgh, will hereafter devote his entire attention to the radio operations of the company, according to a recent announcement by A. W. ROBERTSON, chairman of the board of control. J. S. TRITLE, formerly general manager of the Westinghouse merchandising department, with headquarters at Mansfield, Ohio, will assume responsibility for the company's manufacturing operations.

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ELMER A. SPERRY, president American Society of Mechanical Engineers, addressed a special dinner meeting of the Engineers' Society of Milwaukee, on Friday evening, May 3, discussing particularly the combination of electrical and mechanical elements in gyroscopic compasses and stabilizers for ships and airplanes.

GEORGE A. RICHARDSON, of the Bethlehem Steel Co., is to give a lecture illustrated by motion pictures on "Manufacture of Steel and Steel Products" in the Schroeder Hotel, Milwaukee, on May 9.

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D. C. SCHULTZ has been appointed production manager of one of the divisions of Servel, Inc., Evansville, Ind. He has been identified for the past 20 years with various companies in production work, including the Morgan Engineering Co., Youngstown Sheet & Tube Co., Vacuum Oil Co., and Timken Roller Bearing Co.

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E. F. DAVIS, metallurgist, Warner Gear Co., Muncie, Ind., addressed the Cincinnati chapter of the American Society for Steel Treating, May 2, on "Factors Influencing the Strength and Wear of Gear Teeth."

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C. A. DUNN, formerly general superintendent of the Globe Seamless Tube Co., Milwaukee, and more recently with the Hutto Engineering Co., Detroit, has become general manager of the Appleton Steel Tube Co., Appleton, Wis.

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J. B. DE WOLFE, for a number of years Philadelphia district sales manager of the Trumbull Steel Co. and since its acquisition by the Republic Iron & Steel Co., associated with the Philadelphia sales office, has been appointed assistant manager of the tin plate department and will make his headquarters in Youngstown after June 1.

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H. B. SPACKMAN of the Lukens Steel Co., Coatesville, Pa., who recently resigned as director of purchases to become chairman of the executive committee, will be the guest of honor at a dinner to be given for him May 8, at the Arcadia Cafe, Philadelphia, by the Philadelphia chapter of the Institute of Scrap Iron and Steel.

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G. T. SHANTS, Philadelphia district sales manager of the Lukens Steel Co., will sail May 10 on the *Rotterdam* for a short vacation in Holland and France.

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GENERAL T. C. DICKSON, commanding officer, Watertown Arsenal, Watertown, Mass., was scheduled to speak on "Centrifugal Casting of Big Guns" at the May meeting of the Milwaukee chapter of the American Society for Steel Treating, May 7, at the Pfister Hotel.

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HENRY SEARS HOYT, president, Edgar Allen Steel Co., Inc., New York, and member of the firm of A. Milne & Co., New York, has returned on the Aquitania from a several months' trip to England and Sweden, where he visited many of the leading iron and steel mills.

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W. L. SIDDALL, delegate director of the metal group companies of the Imperial Chemical Industries, Ltd., Birmingham, England, accompanied by George A. V. Russell and John E. Malam of the same organization, arrived in New York, April 26, for a 12 weeks' tour of the United States to study the latest developments in rolling mill practice, particularly in the non-ferrous field.

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STERLING H. BUNNELL, industrial department, National City Co., New York, is about to take a trip to South America to be gone two months.

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NEAL J. CRAIN has been appointed assistant to the purchasing agent of the United Engineering & Foundry Co., Pittsburgh. He has been identified with the company since 1913 and has served as buyer since 1920.

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SIR OLIVER LODGE delivered the nineteenth annual May lecture before the Institute of Metals on May 7, in London. The title of the lecture was "Some Ideas about Metals."

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M. W. ELMENDORF has resigned from the Pfaudler Co., Rochester, N. Y., effective May 1, to enter the engineering division of the Rochester plant of the Taylor Instrument Co.

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THOMAS BLAGDEN, for some years identified with the New York office of the Pennsylvania Steel Co., and the Bethlehem Steel Co., which acquired the Pennsylvania company, recently returned from an absence abroad in the interests of the White Co., Cleveland, automobile truck manufacturer, and has been elected vice-president of the company in charge of export sales, with headquarters at 220 Broadway, New York.

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WALTER I. BREGMAN succeeds his father, the late Louis I. Bregman, as president of the Price Iron & Steel Co., Chicago, dealer in scrap iron and steel.

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PAUL LLEWELLYN, president and general manager of the Interstate Iron & Steel Co., Chicago, returned May 6 from a two months' sojourn in Europe.

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CHARLES T. CAMPBELL has resigned as president of the Union Barge Line Corporation, Pittsburgh, and JOSEPH H. GILMORE, heretofore vice-president, has been appointed acting president. The company operates a number of barges for carrying steel on the Ohio River.

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J. W. RUMELY, with offices at 333 North Michigan Avenue, Chicago, will become Chicago district sales manager of the motor department of the Ohio Electric & Controller Co., on June 1.

New Haven Steel Treaters to Visit Steel Spring Plant

Members of the New Haven chapter of the American Society for Steel Treating have planned a "Get Together Meeting" for the monthly May session, Tuesday, May 28. The chapter will be entertained by the Wallace Barnes Co., Bristol, Conn., the afternoon and evening of that day.

A visit to the cold rolling mill at Forestville, Conn., is scheduled for early in the afternoon, followed by an inspection of the principal spring manufacturing plant at Bristol. Late in the afternoon there will be bowling and pool matches, with a dinner in the auditorium. At 8 p. m. the Wallace Barnes male chorus of 40 voices will entertain the visitors, after which R. W. Cook, vice-president and factory manager of the Wallace Barnes Co., will deliver an address entitled "Manufacture and Heat Treatment of Springs."

Poor & Co. Purchase Rail Joint Co.

Poor & Co., railroad equipment, Railway Exchange Building, Chicago, have purchased 96 per cent of the stock of the Rail Joint Co., 165 Broadway, New York, manufacturer of rail joints. At a directors' meeting of the Rail Joint Co. on April 29 Fred A. Poor was elected chairman of the board of that company, which will be operated independently as in the past, with V. C. Armstrong as president.

Installing New Pack Furnaces

The Central Alloy Steel Corporation, Massillon, Ohio, is equipping its entire Massillon sheet rolling mill works with modern pack furnaces. It is stated that with the new equipment the productive capacity of automobile body sheets in the plant will be increased to 150,000 tons annually, a gain of nearly 40 per cent.

Urges Standardization of Wire and Sheet Gaging

Need for standardization of gage systems for wire and sheet metal is emphasized in a letter received recently by the sectional committee on wire and sheet metal gages from Prof. A. L. Townsend, professor of mechanical engineering, Massachusetts Institute of Technology, Cambridge, Mass. According to a statement by the American Standards Association, New York, Professor Townsend's letter says, in part:

"An informal canvass of my associates indicates that almost any consolidating change in the existing gages would be far more desirable than the present state of affairs. They seem to feel that the expression of sheet and wire sizes by decimal sizes, alone, would be the first logical step. After that, overlapping sizes in the various systems, especially when the tolerances are considered, would be more or less automatically eliminated. . . .

"The general feeling among electrical engineers is that it would be very desirable from their standpoint to have the wire in sizes that would give even units of circular mils. However, this idea has been mentioned as unimportant when compared to the major question of establishing a new and simple wire gaging system. Several suggestions made are to this effect: One sheet metal gage such as the United States Standard, and one for wire, such as the B. & S. or American gage."

The technical committee on this standardization project, which is designated as the No. B 32, will hold a meeting some time this month.

National Oil and Gas Power Meeting

For the second consecutive year the Oil and Gas Power Division of the American Society of Mechanical Engineers will hold its national meeting at State College, Pa., in conjunction with Pennsylvania State College. The sessions will be devoted to high-speed oil engines with papers on such topics as high-speed oil-engine design; high-speed oil-engine pumps and injection valves; combustion in high-speed oil engines and on recent developments in the commercial application of high-speed oil engines. There will be a paper of particular interest to Diesel engine users, on "Modern Refinement in Diesel Power Plants," by E. J. Kates, in which the author will discuss the use of various accessories and auxiliaries, including automatic controls.

Gear Makers to Be Addressed on Cost Methods

"Knowing Your Costs," by Louis G. Goetz, manager of the factory system department, Nau, Taylor & Swearingen, Cleveland, is one of the papers planned for the thirteenth annual meeting of the American Gear Manufacturers Association, which will be held at the Hotel Statler, Cleveland, May 16, 17 and 18.

"Gear Geometry," by A. H. Candee, Gleason Works, Rochester, N. Y., will be another outstanding contribution, and standard design and other technical practices will be discussed under the chairmanship of B. F. Waterman, engineer, Brown & Sharpe Mfg. Co., Providence, and chairman of the association's general standardization committee. The chief speaker at the informal banquet, to be held Friday evening, May 17, will be the Hon. William R. Hopkins, City Manager of Cleveland.

Engineers Discuss Material Handling

(*Concluded from page* 1288)

trade, however, with its great demand for high-class equipment, did afford to the engineers interested an opportunity to standardize the equipment for progressive assembly. The automobile industry has had two marked influences on other trades," according to Henry M. Lane, Detroit.

"Firstly, the accessory and supply trades furnishing auxiliary equipment or parts for the automotive trade have naturally followed the lead of the automotive industry. The plants have been equipped to take advantage of all that the parent industry had learned in the way of progressive or group assembly, and this has resulted in applying various types of conveyors.

"The second influence has been on parallel industries, or other industries supplying a large trade demand for any specialty.

Demand for Labor-Saving Appliances

"The automobile has also had another influence on American life. With the coming of the automobile living has been speeded up and at the same time people are demanding more leisure to enjoy the automobile and the pleasures it brings with it. At the same time the increase in number of large masses of help in the automobile and parallel lines has taken a considerable percentage of the domestic help away from the home and this has resulted in a demand for all classes of household labor-saving equipment, including iceless refrigerators, washing machines, ironing machines, vacuum cleaners, floor polishers, dish washers and other appliances.

"The average home today probably uses the sewing machine less than did the previous generation, on account of the great increase in ready-to-wear garments and the simplification of many things along this line. At the same time, other domestic appliances are demanded in increasing numbers.

Making Washing Machines en Masse

"One of the outstanding examples in the household utility field is that of the Maytag washing machine. This organization has gradually switched from the production of a general line of agricultural equipment to a practically 100 per cent washing machine output. As the sales organization brought heavier demands on the factory for output, the engineers have had to answer this demand by using an ever-increasing number of continuous production units."

The speaker then described briefly some of the equipment covered in the articles published in 1927 by THE IRON AGE, as mentioned in a previous paragraph.

IRON AGE

More Pig Iron to Meet the High Prices

Scarcity of Metal in Britain Being Relieved—German Export Prices Firm —Cartels Still Under Active Discussion

(*By Cable*)

LONDON, ENGLAND, May 6.

PIG iron prices are strong and supplies scarce despite the increased Cleveland output. Since Jan. 1, a total of nine Cleveland furnaces have resumed and four more are to be blown in this month. Local steel demand is absorbing the bulk of present production and Cleveland makers are sold out until August. Some sellers have withdrawn all quotations.

Hematite production recently increased, but tonnage for delivery before June is still difficult to obtain. Prices are firm but it is possible to obtain concessions on substantial contracts for the second half of the year.

Finished steel demand has declined, but export to the Far East is expected to improve following the reduction in freight rates to Japan, Hong Kong and Shanghai. Mills are moderately well engaged, as specifications are coming out more freely. Prices are firm and increases are expected soon.

The Clyde shipbuilding output in April was 22 vessels of 44,500 tons.

Demand for Continental steel here is quiet and only a few odd parcels of semi-finished material have been sold. In certain districts, British material is now cheaper. Finished material is inactive, with merchant bar prices weaker, but beams are firm as a result of the strength of sheet bars.

Tin plate activity is well maintained and prices are stiffening. Galvanized sheet makers have decided to regulate output in accordance with the demand. The market is firmer, on the strength of this, and inquiry is improving. Far Eastern demand for black sheets is moderate in the heavy gages, but quiet for the lighter specifications.

The Austin Friars Trust has announced acceptance of its offer to purchase the shares of the United Steel Cos., Ltd., and the preferred shares of the United Strip & Bar Mills, Ltd., payment to be made on June 19.

Sir W. G. Armstrong, Whitworth & Co. will build 11 locomotives for the Eastern Bengal Railway. Hanomag of Hannover has secured orders for 22 locomotive boilers and Henschel of Kassel for 25 boilers for the Indian Railways.

The Pont-à-Mousson works in France is reported to have secured an order from Detroit, Mich., for 5000 tons of cast iron pipe at an average price of $39.30 per ton, delivered.

The new freight rates from the United Kingdom are 25s. ($6.05) per ton to Boston, New York, Philadelphia, Baltimore and New Orleans, 27½s. ($6.66) per ton, plus 10 per cent, to Buenos Aires, 27½s. ($6.66) per ton to Rio de Janeiro, 30s. ($7.26) per ton to Yokohama, Shanghai and Hong Kong.

German Coal Strike in Prospect

Steel Demand Moderately Active—Average Dividends of Steel and Coal Companies Last Year Showed Increase

BERLIN, GERMANY, April 22.—With the Ruhr coal miners seeking increased wages because of greater per ton profits by the operators since wages were advanced to the present level, about a year ago, an early strike is looked for. The majority report of the Schmalenbach Commission, which investigated the ability of the mine operators to increase wages, stated

British and Continental European prices per gross ton, except where otherwise stated, f.o.b. makers' works with American equivalent figured at $4.85 per £ as follows:

Durham coke, del'd	£0	18½s.	to £0	19s.	$4.48	to	$4.60
Bilbao Rubio ore*	1	3			6.18		
Cleveland No. 1 foundry	3	11			17.21		
Cleveland No. 3 foundry	3	8½			16.61		
Cleveland No. 4 foundry	3	7½			16.37		
Cleveland No. 4 forge	3	7			16.25		
Cleveland basic (nom.)	3	7½			16.37		
East Coast mixed	3	13½			17.70		
East Coast hematite	3	14			17.94		
Rails, 60 lb. and up	7	15	to 8	15	37.59	to	42.43
Billets	6	7½	to 6	10	30.91	to	31.52
Ferromanganese	13	15			66.69		
Ferromanganese (export)	13	10	to 14	0	65.47	to	67.90
Sheet and tin plate bars, Welsh	6	5	to 6	7½	30.31	to	30.91
Tin plate, base box	0	18½	to 0	18¾	4.45	to	4.53
Black sheets, Japanese specifications	13	7½	to 13	10	64.87	to	65.47
					C. per Lb.		
Ship plates	7	12½	to 8	2½	1.66	to	1.76
Boiler plates	9	0	to 10	10	1.95	to	2.27
Tees	8	2½	to 8	12½	1.76	to	1.86
Channels	7	7½	to 7	17½	1.60	to	1.71
Beams	7	2½	to 7	12½	1.55	to	1.65
Round bars, ¾ to 3 in.	7	12½	to 8	2½	1.65	to	1.76
Steel hoops	9	0	to 10	0	1.95	to	2.16
Black sheets, 24 gage	10	5	to 10	10	2.21	to	2.27
Galv. sheets, 24 gage	13	12½	to 13	15¾	2.94	to	2.98
Cold rolled steel strip, 20 gage (nom.)	12	0			2.64		

*Ex-ship, Tees, nominal.

Continental Prices F.O.B. Antwerp or Hamburg

Foundry iron, 2.50 to 3.00 per cent sil., 0.50 to 0.90 per cent phos.	£3	7½s.	to £3	12s.	$16.37	to	$17.45
Foundry iron, 2.50 to 3.00 per cent sil., 1.00 per cent and more phos.	3	9			16.73		
Billets, Thomas	5	4	to 5	7	25.22	to	26.07
Sheet bars, Thomas	5	9	to 5	10	26.43	to	26.68
Wire rods, Low C., No. 5 B.W.G.	6	5	to 6	6¼	30.31	to	30.61
Black sheets, No. 31 gage, Japanese	12	12½			61.16		
Rails, 60 lb. and heavier	6	10*			31.52		
Rails, light	6	0			29.10		
					C. per Lb.		
Steel bars, Thomas	5	19	to 6	2	1.28	to	1.33
Beams, Thomas, British standard	5	5	to 5	7½	1.13	to	1.20
Channels, Thomas, American sections	6	5			1.35		
Angles, Thomas, 4-in. and larger, over ⅜-in. thick	5	10			1.15		
Angles, Thomas, 3-in.	5	14			1.23		
Ship plates, open-hearth, inspected	7	10			1.62		
Hoop and strip steel, over 6-in. base	6	7½			1.38		
Wire, plain, No. 8 gage	7	12½			1.65		
Wire, galvanized, No. 8 gage	9	10			2.06		
Wire, barbed, 4-pt. No. 12 B.W.G.	12	0			2.60		
Wire nails, base	8	0			$1.73 per keg		
Wire nails, assortments, 1 to 6-in., keg	10	10			2.27		

*Open-hearth steel, 7½s. ($1.82) per ton extra.

that in November of last year the average profit per ton was 1.47 m. (35c.), which included profits on by-product coke and briquettes. The miners' federation has furnished data to show that by December profits were 3.47 m. (82c.) per ton, but the coal operators claim it was only 2.62 m. (62c.) per ton. While it is certain that operations have been more profitable recently, the actual amount of profit is not definitely known.

No change in domestic iron and steel prices has been announced for May. Business is more active, and demand for structural material is particularly good. Engineering plants and machinery manufacturers both report business slack, but shipbuilders are buying more tonnage than had been expected and the railroads are active. The Railroad Corporation plans to increase the trackage in the Ruhr-Cologne-Dortmund district, and car builders are negotiating for a large contract.

The railroad car builders are planning to establish a domestic syndicate as a preliminary to organization of a Continental cartel. Negotiations between French and German companies are already under way.

The export market for heavy iron and steel products is moderately active and prices are well maintained. South American markets are quiet, and renewed warfare in China has reacted against sales to the Far East.

Recently a German mill booked a Japanese order for 12,000 tons of ship plates, and sales of steel bars, sheets and tubes, totaling about 13,000 tons, have been made to Russia. Although the wire rod market has been active, the Vereinigte Stahlwerk A. G. has applied for official permission to suspend the operation of one mill. The corporation has been producing 42,000 tons of wire rods a month, but states that it can dispose of only 32,000 tons monthly.

Financial statements of German corporations are, as a whole, satisfactory. The average dividend of producers of coal and heavy steel in 1928 was 9.1 per cent, compared with 9 per cent in the preceding year; of non-ferrous metal producers, 7.4 per cent, compared with 7.2 per cent in 1927; and of machinery builders, 11.2 per cent, compared with 8.8 per cent in 1927. In the automotive industry the average dividend was 0.6 per cent, compared with 1.4 per cent in 1927.

British Pig Iron Output Increased

More Furnaces in Blast with Improved Coke Supply—Scrap Scarce—Tin Plate Orders Heavy

LONDON, ENGLAND, April 26.—The return to normal temperatures on the Continent, after the severe weather of a few weeks ago, has relaxed the pressure for British coke supplies, and British pig iron producers are blowing in additional furnaces. Demand for pig iron, both from domestic and export users, has been so steady that makers in the Cleveland district have sold most of their output for this quarter, and are asking premiums for more extended deliveries.

The strengthening of pig iron, coupled with an acute scarcity of steel scrap, has resulted in a firmer market in semi-finished material. Continental semi-finished steel is being bought sparingly, many users preferring to pay more for the British product to obtain earlier delivery.

The heavy steel industry is still suffering from excess capacity, and plate and shape mills are unable to secure price advances, such as have been put into effect on other products. A considerable volume of business has been coming from shipbuilders, but the general export demand is still only a shadow of normal.

Tin plate makers, under their restriction of output plan, are in a satisfactory position. A number of mills have good order books for the rest of the year and most are sold out for the first half. Galvanized and black sheets are dull.

With the general election now definitely in the foreground, utterances by public speakers are watched carefully for any indications of the future policy to be adopted, especially on iron and steel.

The question of the relative quality of British and Continental material has lately arisen among Sheffield steel makers. It is suggested that, while British steel founders are compelled to adhere strictly to British standard specifications, Continental makers are permitted to evade them. An investigation of the chemical properties of a number of imported steel castings showed that in some the sulphur and phosphorus contents were extremely high compared with British standards.

International Strip Cartel a Possibility

DÜSSELDORF, GERMANY, April 19.—Certain steel men here look for the early establishment of a third international cartel, following the successful renewal of the tube and rail makers' associations with the inclusion of all world producers of any consequence. The cartel under consideration would control hot-rolled hoops and strips for conversion into tubes.

At present there is a Continental hoop and strip cartel, which includes most of the important producers. Non-members are Poland, Sweden, Austria, Hungary and Czechoslovakia, but their total exports are not in excess of 3000 to 4000 tons a year and, besides, they may soon join the cartel. Negotiations are now under way with British, American and Canadian producers with a view to establishing an association similar to the recently formed International Tube Cartel.

Active Interest in German Steel Houses

HAMBURG, GERMANY, April 20.—Stahlhaus G.m.b.H., manufacturer of steel dwellings, is now working in cooperation with the Austrian and Hungarian steel industries on steel house construction and has licensed a French company, the Forges de Strasbourg. Negotiations for licenses are also under way with Swedish, Italian and Czechoslovakian manufacturers.

German Export Prices Firm Except on Bars

(*By Radio*)

BERLIN, GERMANY, May 6.

Domestic business is slightly improved with increasing orders from the engineering industry and a good demand for bars, ship plates and pig iron. Semi-finished material is quiet.

The export market for pig iron and semi-finished steel is firm and the tendency of prices is upward. Foreign demand for wire, wire rods and heavy-gage sheets is good and prices are well maintained. Steel bars for export are less firm and prices are off slightly.

On recent sales, f.o.b. Antwerp, billets have brought £5 4s. to £5 7s. ($25.22 to $25.95), slabs £5 8s. ($26.19) and steel bars £5 19s. to £6 2s. per ton (1.28c. to 1.33c. per lb.).

New Mannesmann Steel Plant to Operate Soon

BERLIN, GERMANY, April 22.—The new iron and steel works of the Mannesmann Tube Corporation at Huckingen is expected to be put into operation soon. This represents a further step in the efforts of the corporation to supply its own raw material requirements. Originally the Mannesmann Tube Corporation produced only tubes, buying billets from other producers, principally the Friedrich Krupp A. G. at Essen.

German Reparations Deliveries Gain

BERLIN, GERMANY, April 22.—There is considerable discussion in the steel and engineering industries of the possible effects of French agitation against deliveries in kind, which is directed chiefly at machinery. Deliveries in kind increased from a value of 7,513,000 m. ($1,773,068) in 1927 to 24,289,000 m. ($5,732,204) in 1928. Deliveries to all coun-

tries receiving reparations in kind increased from 23,524,000 m. ($5,551,664) in 1925 to 46,889,000 m. ($11,065,834) in 1928. Shipments for 1928, classified, were as follows:

Locomotives	796,000 m.	$187,856
Textile machinery	12,702,000 m.	2,997,672
Machine tools	7,317,000 m.	1,726,812
Agricultural mach'ry	1,009,000 m.	238,124
Boilers and machine parts	20,778,000 m.	4,903,608
All others	4,287,000 m.	1,011,732
Total	46,889,000 m.	$11,065,834

Since 1925 reparations deliveries of textile machinery and of boilers and machine parts have trebled, but locomotive deliveries, which reached a total value of 11,152,000 m. ($2,631,872) in 1926, have almost ceased in recent months.

New Tube Cartel to Control Exports

HAMBURG, GERMANY, April 20.—Continental tube mills generally believe that the new International Tube Cartel, which includes all producing countries but Sweden and Japan, will be successful in controlling prices. The production of the two non-members is equal to only about 1.5 per cent of the entire European output. Many tube manufacturers, however, doubt that the cartel will prove entirely successful, despite the appointment of a control agent with headquarters in London, who will seek to prevent excessive shipments to member countries. It is pointed out that attempts of other cartels to exercise control have failed in most cases.

German Cartels Likely to Be Renewed

LONDON, ENGLAND, April 24.—The successful renewal of international agreements among rail makers and tube mills has strengthened the position of the German cartels. The small producers, who formerly were inclined to demand increases in their allotments, are expected to agree to a continuation of former conditions, and current negotiations will almost certainly lead to an extension of the cartels for another four years.

It is believed likely that the International Rail Makers' Association will extend its control over steel sleepers and fish plates, the prices of which have shown an upward tendency lately.

Continental Sheets Unable to Compete with British

HAMBURG, GERMANY, April 20.—The recent effort of Continental producers of corrugated galvanized steel sheets to expand their export trade has not been successful. The producers were unable to meet the competition of British mills, and exports from Germany have declined to a small tonnage, while Belgian and French shipments are almost exclusively to their colonies.

Office Removals

Hickman, Williams & Co. have moved their Chicago office from the McCormick Building to the Union Carbide & Carbon Building at 230 North Michigan Avenue. Hickman, Williams & Co. have opened a branch office in the Roanoke Building, Minneapolis. Donald Smith, formerly manager of coal sales for the Ford Motor Co., will be in charge. This office will distribute coal and coke from the Ford dock at Duluth.

—

National headquarters of the American Association of Engineers has been moved from East Adams Street, Chicago, to the eighth floor of the Willoughby Tower, Michigan Boulevard, Madison Street, Chicago.

—

New York offices of Page Steel & Wire Co. were recently moved from Grand Central Terminal Building to New York Central Building, 230 Park Avenue.

—

American Engineering Co., Taylor Stoker Division, is moving its Pittsburgh office to 2141 Oliver Building.

—

Cohoes Rolling Mill Co. has moved its New York office to 342 Madison Avenue.

—

Southern Wheel Co. has moved its headquarters from the Grand Central Terminal Building to 230 Park Avenue, New York.

—

Calumet Steel Co., Chicago, will move its offices about May 15 from 208 South LaSalle Street to the thirty-sixth floor of the Foreman National Bank Building, 33 North LaSalle Street.

—

Molthop Supply & Mfg. Co., Chicago representative for the Vierling Steel Works, fabricator of structural steel, has moved from 332 South Michigan Avenue to 120 South LaSalle Street.

—

Republic Iron & Steel Co., will move its Chicago office May 11 from room 758 to room 1214, McCormick Building.

—

Brooke L. Jarrett & Co., engineers, Oliver Building, Pittsburgh, have moved into larger quarters in the Koppers Building.

—

Southern Manganese Steel Co., St. Louis, has moved its Pittsburgh office to larger quarters in the Koppers Building.

—

New York City offices of the American Chain Co. were recently moved from Grand Central Terminal Building to the New York Central Building, 230 Park Avenue. The Pittsburgh offices of the same company were also moved to 701-705 American Bank Building.

—

Quigley Furnace Specialties Co. has moved its office in New York from 26 Cortlandt Street to 56 West Fifty-fourth Street.

—

Weirton Steel Co. moved its Pittsburgh office on April 29 from 514 Frick Building to 2803 Grant Building.

Magnesium Output in 1928 Increased

Sales of magnesium, produced in the United States in 1928, amounted to 865,662 lb., valued at $779,674, as compared with sales of $366,400 lb., valued at $441,700, in 1927, according to the United States Bureau of Mines. Of the magnesium sold in 1928, 84 per cent was in ingot form at prices ranging from 55c. to 85c. per lb., and such sales increased 189 per cent as compared with 1927. Sales of castings in 1928 were 55,860 lb., an increase of about 75 per cent as compared with 1927. Sales of wire increased 61 per cent, but those of tubing decreased nearly 40 per cent as compared with 1927. Sales of sheet, which constituted 3 per cent of the total in 1927, amounted to slightly under 1 per cent of the total sales in 1928. The average price of domestic ingot metal in 1928 was 66c. per lb., that of powder, $1.51 per lb., and of castings, $2.39 per lb.

Imports of magnesium metal in 1928, consisting mainly of powder, were 12,039 lb., valued at $11,890, as compared with 7131 lb., valued at $8,402, in 1927.

Binks Mfg. Co. Taken Over by New Interests

Neil C. Hurley and J. F. Roche, known as the Chicago Utilities Corporation, have purchased and taken over the active management of the newly reorganized Binks Mfg. Co., Chicago, manufacturing spray painting equipment and spray cooling systems. This company was formerly known as the Binks Spray Equipment Co. Mr. Hurley, president of the new company, was formerly vice-president, president and chairman of the board of directors of the Hurley Machine Co. J. F. Roche, who was formerly manager of the Montana Power Co., vice-president of the Apex Electric Distributing Co., and assistant to the president of the Edison Electric Appliance Co., is executive vice-president and treasurer of the reorganized company.

Empire Steel Corporation, Mansfield, Ohio, plans extensions and improvements in sheet steel mill at Niles, Ohio, to cost about $100,000, with equipment. Company will also build one-story addition to plant at Ashtabula, Ohio, to cost $50,000.

Where Steel Exports Went in First Quarter

Canada Took 181,189 Tons of Nine Leading Items—Japan Retains Second Position with 43,901 Tons, Followed by Argentina, 20,764 Tons; Philippines, 13,630 Tons; Chile, 11,459 Tons; Mexico, 10,005 Tons

Exports from United States, by Countries of Destination

	Steel Plates				Galvanized Sheets				Black Steel Sheets			
	March		Three Months Ended March		March		Three Months Ended March		March		Three Months Ended March	
	1929	1928	1929	1928	1929	1928	1929	1928	1929	1928	1929	1928
Total	*15,115*	*12,787*	*51,465*	*38,991*	*13,978*	*15,531*	*48,070*	*37,926*	*16,576*	*13,292*	*48,690*	*44,135*
Canada	13,230	10,784	41,815	28,959	3,232	3,072	9,308	7,397	9,115	6,533	25,299	15,810
Japan	465	8	859	355	....	548	810	644	2,449	4,978	5,751	22,130
Cuba	13	38	629	97	536	510	1,653	1,402	46	239	503	650
Philippine Islands	63	591	81	649	2,391	2,715	8,817	7,066	785	97	1,682	860
Mexico	40	78	221	150	928	563	2,616	1,490	381	160	923	505
Argentina	....	....	....	....	517	535	1,977	1,910	321	174	1,190	454
Chile	....	....	....	....	....	....	....	....	922	33	1,447	61
Colombia	....	....	....	....	546	389	2,368	1,672	....	....	118	217

	Steel Rails				Barbed Wire				Plain and Galvanized Wire			
	March		Three Months Ended March		March		Three Months Ended March		March		Three Months Ended March	
	1929	1928	1929	1928	1929	1928	1929	1928	1929	1928	1929	1928
Total	*11,277*	*15,798*	*46,309*	*53,941*	*6,576*	*7,076*	*18,747*	*17,030*	*5,341*	*5,072*	*14,684*	*12,044*
Canada	1,958	699	4,760	1,885	345	610	556	951	2,156	2,299	5,335	4,944
Japan	....	1,462	1,300	3,358	....	....	....	....	233	108	711	224
Cuba	....	46	443	596	231	370	712	929	158	103	362	164
Philippine Islands	704	....	1,092	3,236	869	....	1,717	303	73	....	241	39
Mexico	106	1,372	1,403	2,166	565	468	2,090	1,517	111	238	469	550
Argentina	521	....	1,266	1,360	....	....	3,170	3,154	1,055	....	3,135	....
Chile	3,551	2,409	5,928	7,513	109	....	156	67	92	....	205	....
Colombia	1,407	865	1,839	3,081	298	486	1,300	948	....	....	....	....
Brazil	301	2,514	3,387	7,134	1,360	1,675	3,576	3,539	69	44	256	250

	Tin Plate				Steel Bars				Plain Heavy Structural Material			
	March		Three Months Ended March		March		Three Months Ended March		March		Three Months Ended March	
	1929	1928	1929	1928	1929	1928	1929	1928	1929	1928	1929	1928
Total	*24,478*	*22,755*	*77,552*	*60,552*	*23,823*	*12,005*	*63,619*	*30,566*	*24,685*	*15,148*	*63,477*	*38,366*
Canada	5,017	4,439	11,318	9,804	10,923	7,182	31,792	18,429	18,618	11,682	51,006	31,070
Japan	7,886	2,769	21,523	14,438	5,256	39	10,914	252	1,820	329	2,033	867
Cuba	1,024	650	2,077	1,053	496	598	1,582	1,194	395	606	935	1,320
Mexico	556	2,018	2,004	4,089	66	210	279	....	....	....	....	....
Argentina	1,884	2,260	8,033	4,627	....	....	132	....	....	....	1,861	....
Chile	631	311	1,754	909	....	....	....	....	780	158	1,918	636
Brazil	126	1,045	1,090	1,129	546	....	1,082	....	....	....	....	....
China	1,727	2,647	8,643	3,650	....	....	....	....	....	....	....	....
British India	89	1,627	2,999	1,627	....	....	....	....	....	....	....	....
United Kingdom	....	....	....	....	2,549	1,586	6,615	4,271	....	....	....	....
Italy	455	2,142	1,644	3,611	....	....	....	....	....	....	....	....

Destination of Iron and Steel Exports from the United States

(In Gross Tons)

Country of Destination	March, 1929	January Through March 1929	January Through March 1928
North and Central America and West Indies	*135,333*	*379,520*	*288,689*
Canada and Newfoundland	113,359	303,241	231,449
Cuba	5,273	18,018	16,801
Guatemala	1,039	2,050	4,364
Honduras	1,890	4,690	2,146
Panama	1,435	6,668	4,507
Salvador	492	2,515	731
British West Indies	1,598	9,096	1,763
Other West Indies	3,116	9,305	4,759
Other Central America	7,131	23,937	22,169
South America	*41,170*	*133,445*	*104,242*
Argentina	8,337	33,963	23,571
Brazil	3,792	17,246	20,211
Chile	8,034	17,480	18,120
Colombia	7,084	16,461	16,825
Peru	3,483	12,070	8,269
Uruguay	967	4,457	1,799
Venezuela	8,874	30,372	13,970
Other South America	599	1,396	1,477
Europe	*32,460*	*91,586*	*39,724*
Belgium	894	1,120	3,699
France	1,447	7,079	810
Greece	888	1,011	117
Italy	8,776	32,222	4,011
Netherlands	462	878	796
Rumania	457	934	693
Soviet Russia	407	1,404	1,222
United Kingdom	6,119	15,891	13,262
Other Europe	13,010	31,047	15,114
Far East	*59,350*	*194,082*	*176,515*
British Malaya	341	3,071	1,921
China	4,776	22,849	32,957
Netherlands East Indies	8,062	26,364	6,403
India and Ceylon	1,243	7,421	9,620
Japan and Chosen	30,430	90,238	91,884
Kwantung	1,389	6,451	1,870
Philippine Islands	11,108	26,577	25,484
Australia	1,309	5,636	4,478
New Zealand	198	1,168	496
Other Asia and Far East	494	4,307	1,406
Africa	*2,612*	*6,299*	*4,348*
British South Africa	1,190	1,936	2,139
Egypt	1,054	3,488	1,419
Mozambique	105	255	208
Other Africa	263	620	582
Total	270,925	804,932	613,522

Average Prices of Ingot Brass in April

The Non-Ferrous Ingot Metal Institute, a national organization of smelters of ingot brass, reports the average prices per pound received by its entire membership during the 28-day period ended April 26, on the six principal mixtures of ingot brass. There are no generally accepted specifications for ingot brass. Therefore, the statistics for each item below are made up of numerous sales of metal known to the trade by the name of the general designation shown, but each item, in reality, including many variations in formulas. An understanding of the term "commercial," as here used, is therefore necessary, to avoid misunderstanding or confusion in reading the following statistics:

April Prices, Cents per Lb.

Commercial 80-10-10 (1 per cent impurities)	18.909
Commercial 78 per cent metal.	15.783
Commercial 81 per cent metal.	16.00
Commercial 83 per cent metal.	18.743
Commercial 85-5-5-5	18.135
Commercial No. 1 yellow brass ingot	14.521

The Non-Ferrous Ingot Metal Institute has been engaged for several months in gathering statistics as to specifications for ingot brass served in the past. These data are being used by a special committee of the American Society for Testing Materials to determine the relative importance in volume of each distinctly separate alloy. Within a reasonable length of time, the institute hopes to develop, through the American Society for Testing Materials, a fairly complete set of specifications covering the bulk of ingot brass requirements for all purposes. Eventually, the institute will probably undertake a comprehensive program of technical research to increase accuracy in manufacture and in casting; and to determine the most efficient and economical mixtures and methods for the use of these metals for all purposes.

Bauxite Consumption in Eastern States

Bauxite finds its market east of the Mississippi River and is sold largely to the manufacturers of aluminum, abrasives, commercial chemicals and refractories, says the United States Bureau of Mines in a recent publication. The manufacturers of alumina cements are largely supplied by imported bauxite. High-alumina (diaspore) clays produced in Missouri are now used in the manufacture of refractories and are sold according to their alumina content. Three grades containing 55, 65, and 70 per cent of alumina are regularly handled.

The largest consumers of bauxite in the United States are also producers, and only a small market exists for what might be called "outside bauxite." There is only one way to determine the value of bauxite, and that is by chemical analysis, which should show total silica, alumina, titanium oxide, iron oxide and water. Bauxites of commercial grade should carry at least 52 per cent of alumina.

The Southern Experiment Station of the Bureau of Mines, Birmingham-Tuscaloosa, Ala., is making an investigation of the beneficiation of low-grade, high-silica and high-iron bauxites. Flotation tests using sodium sulphide and oleic acid on material crushed in such manner as to produce little slime seem to be promising.

Growing Use of Electrical Appliances

WASHINGTON, May 3.—The growing use of electricity and of electrical appliances is one of the most typical characteristics of American contemporary industrial civilization, with its tendency toward increasing mechanization and the use of labor and time-saving devices, not only in the factory, but in the home as well, according to Dr. Leo Wolman, National Bureau of Economic Research. He makes this point in the course of a chapter on "Consumption and Standard of Living" in the fact finding survey conducted by the Committee on Recent Economic Changes, of the President's Unemployment Conference, of which President Hoover is chairman. The full report will be made public soon.

Supporting his statement regarding the increasing use of electricity and electrical appliances, Dr. Wolman explained that the industry described in the Census of Manufactures as "electrical machinery, apparatus and appliances," has had a phenomenal growth in a short period. Its value of product of $92,000,000 in 1899 had grown in 1925 to $1,540,002,041, and in 1927 to $1,637,307,035. The number of wage earners employed in it grew from 42,000 in 1899 to 240,000 in 1925 and 246,000 in 1927.

Some of the items and their growth, expressed in value of product, were: Radio apparatus, from $702,000 in 1914 to $191,228,000 in 1927; batteries and parts and supplies, from $23,402,000 in 1914 to $150,216,000 in 1927; household heating and cooking appliances, from $3,465,000 in 1914 to $72,933,000 in 1927. In 1925 the value of the product of the refrigerator industry was nearly $58,000,000, having risen to this level from $15,000,000 in 1915.

In dealing with economic changes, Dr. Wolman points out that, simultaneously with the advance in the use of the automobile, there has been a marked development in the purchase of many commodities that a decade ago would have been described as luxury goods, but which have entered so universally into the average budget as no longer to be regarded as such. The real revolution in American consumption, involving not only radical changes in the ways of living, but also profound industrial consequences, it is declared, is in large measure a function of the introduction of the automobile. It would be difficult, Dr. Wolman says, to find anywhere in economic history so swift and pervasive a revolution.

Corporation Sales Expenses Rising

A survey of 736 corporations by Ernst & Ernst, accountants, New York, shows that a majority of them had higher selling and administrative expenses in 1928 than in 1927. The ratio of those expenses to the total sales of all companies in the aggregate, however, showed a slight decline, the figure for 1928 being 11.73 per cent, compared with 11.81 per cent in the previous year.

The ratio of 379 of the 736 corporations was higher for 1928 than for 1927. Figures for 1926 are available only for 587 of the 736 companies. Of those 587 organizations, 361 had a higher ratio for 1928 than for 1926.

On the basis of an analysis of the reports of these companies, Ernst & Ernst conclude that a lower expense rate per sales dollar normally follows an increase in sales volume, barring offsetting factors of reduced selling prices or actual increase in costs. Such offsets, in whole or in part, were present in 1928. Only two-thirds of the 437 companies that showed an increase in sales over 1927 were able to reduce expenses per dollar of sales.

Some companies, on the other hand, cut down their expense ratio in the face of a decline in business done. This was true of 74 out of 299 companies that suffered a decline in the dollar value of sales.

One means of reducing selling costs, according to Ernst & Ernst, is the taking on of additional lines that can be sold together with the original lines without materially increasing sales expenses. Mergers often work toward the same end, by providing additional sales outlets or better balanced distribution. Entering of the retail field by manufacturers or wholesalers also has the same motive in many cases, although this is generally acknowledged to be a dangerous step, unless the expenses of the new function are carefully analyzed.

Australian imports of industrial machinery for the year ended July 1, 1927, were valued at £4,973,450, an increase of 15 per cent over the preceding year, according to a statement prepared by L. J. Cochrane of the industrial machinery division, Department of Commerce. Great Britain was the principal supplier, furnishing 53 per cent of the total as against 57 per cent during the year 1925-1926. The United States was second with 37 per cent of the total, an increase of 4 per cent over the earlier period. The United States furnished the largest amount of air and gas compressors, canning machinery and appliances, internal combustion engines, mechanical stokers, rubber working machinery, pneumatic tools, pumping machinery and weighing machines.

Machinery Exports Make New Records

Highest Monthly and Quarterly Shipments Abroad Ever Reached— Imports in March Also at Record Height

WASHINGTON, May 2.—Aggregating $59,507,795, exports of machinery of all kinds in March exceeded by $9,492,795 those of January, totaling $50,015,000, and made a new high record. The previous maximum of $56,706,000 was established in January, 1921. Imports also set a high record in March, incoming shipments of machinery and vehicles being valued at $3,723,587, against $3,511,601 in February. The heavy imports of machinery of practically all classes in March are attributed partially to the tariff revision program.

For the first quarter exports of machinery reached the high total of $155,939,925 against $114,598,705 for the corresponding period of last year. This makes another new high record, displacing the previous maximum of $146,333,000 shipped in the first quarter of 1921. The March shipments abroad exceeded by $13,033,078 those of February, valued at $46,474,717, and were $17,141,233 in excess of those of March, 1928, with a total of $42,366,562.

Exports of industrial machinery, as classified by the Division of Statistics, Department of Commerce, were valued at $26,778,042 in March, compared with $21,186,482 in February and $18,849,476 in March of last year. For the three months of 1929 industrial machinery exports were valued at $70,312,943, against $51,097,273 for the first quarter of 1928.

Outgoing shipments in March of power-driven metal-working machinery were valued at $3,788,077, compared with $2,554,299 in February and $1,960,407 in March of last year. For the three months they were valued at $8,885,830, against $5,990,096 during the first quarter of 1928. Exports of other industrial (hand-driven) machinery were valued at $9,569,360 in March, against $6,361,644 in the corresponding month of last year, while for the first quarters they were valued at $24,623,554 and $18,672,979, respectively.

The high volume of exports of machinery and vehicles was reflected generally throughout the list and reached a total of $140,218,763 in March, against $94,378,907 in March of last year. For the first quarter of the current year the total was $351,590,006, compared with $237,774,399 in 1928.

Exports of agricultural implements increased to $13,858,000 in March from $10,530,000 in February and $9,319,000 in March of last year. For the first quarter of 1929 they were valued at $36,799,000, against $25,189,000 for the corresponding period of last year. Metal-working tools also shared in the export records made in March, the number, as listed in THE IRON AGE table being 1016, valued at $2,031,735, compared with 850, valued at $1,376,249, in February.

Imports, as listed in THE IRON AGE table, were valued at $2,989,389 in March, exceeding by $156,085 those for February, valued at $2,833,304. For March of last year they were valued at $1,226,050. For the first quarter of 1929 they aggregated $8,011,868, against $4,745,006 for the corresponding period of last year. Imports of machinery and vehicles during the first quarter were valued at $10,126,585, rising sharply from the first quarter of 1928, when the value was $6,550,038.

Machinery Exports from the United States

(By Value, in Thousands of Dollars)

	March		Three Months Ended March	
	1929	1928	1929	1928
Locomotives	$93	$427	$645	$633
Other steam engines	65	62	224	161
Boilers	200	112	488	261
Accessories and parts	48	85	271	168
Automobile engines	1,920	1,781	4,016	3,478
Other internal combustion engines	812	606	2,041	1,705
Accessories and parts	473	353	1,147	818
Electric locomotives	48	29	231	517
Excavating machinery	787	771	1,727	1,964
Concrete mixers	138	103	412	230
Road-making machinery	284	229	671	650
Elevators and elevator machinery	476	341	1,345	972
Mining and quarrying mach'ry	1,545	1,162	4,127	2,128
Oil well machinery	2,197	1,513	5,940	3,377
Pumps	1,098	871	3,489	1,907
Sheet and plate metal-working machines	352	178	857	400
Forging machinery	206	65	369	211
Machine tools*	2,143	1,185	5,096	4,087
Other metal-working machinery and parts	729	516	1,902	1,397
Textile machinery	1,640	1,233	3,855	3,371
Sewing machines	1,050	802	2,872	2,189
Shoe machinery	206	179	599	481
Flour-mill and gristmill machinery	29	35	179	126
Sugar-mill machinery	307	157	585	1,452
Paper and pulp-mill mach'ry	213	263	674	951
Sawmill machinery	69	102	211	239
Other woodworking machinery	210	115	539	432
Refrigerating and ice-making machinery	1,673	675	3,498	1,839
Air compressors	762	633	2,000	1,494
Typewriters	2,499	1,958	6,449	5,691
Power laundry machinery	148	119	477	252
Typesetting machines	2,499	338	6,448	1,108
Printing presses	690	1,523	1,917	3,907
Agricultural machinery and implements	13,858	9,319	36,799	25,189
All other machinery and parts	20,039	14,527	53,839	40,814
Total	$59,508	$42,367	$155,939	$114,599

*Principal details in another table.

Imports of Machinery Into the United States

(By Value)

	March		Three Months Ended March	
	1929	1928	1929	1928
Metal-working machine tools	$132,899	$48,219	$318,020	$136,386
Agricultural machinery and implements	999,826	526,986	2,366,620	1,473,701
Electrical machinery and apparatus	230,286	243,102	570,131	527,844
Other power-generating machinery	179,150	6,888	277,288	28,303
Other machinery	1,072,025	142,578	3,344,457	1,878,852
Automobiles and other vehicles, except agricultural	375,203	258,277	1,135,352	699,920
Total	$2,989,389	$1,226,050	$8,011,868	$4,745,006

Exports of Power-Driven Metal-Working Machinery

	March, 1929		February, 1929	
	No.	Value	No.	Value
Engine lathes	86	$247,094	72	$116,078
Turret lathes	90	228,767	38	100,911
Other lathes	86	244,872	70	118,353
Vertical boring mills and chucking machines	26	80,361	55	74,733
Thread-cutting and automatic screw machines	77	111,019	63	82,929
Knee and column type milling machines	57	136,602	33	77,090
Other milling machines	89	172,328	65	121,162
Gear-cutting machines	44	142,640	44	107,617
Vertical drilling machines	49	77,151	39	28,864
Radial drilling machines	18	46,475	8	21,969
Other drilling machines	125	52,134	82	38,696
Planers and shapers	45	87,006	49	100,205
External cylindrical grinding machines	99	216,050	77	213,898
Internal grinding machines	46	125,720	40	131,989
Metal-working tool-sharpening machines	79	63,516	115	41,755
Total	1,016	$2,031,735	850	$1,376,249

Machinery Markets and News of the Works

Slight Falling Off in Sales

April Machine Tool Business Probably Less Than That of March, but Buying Is Still Heavy

A SLIGHT falling off in the sales of machine tools during April is indicated by preliminary reports from various districts. It is expected that the monthly report of the National Machine Tool Builders' Association, based on actual returns from tool builders, will confirm this early impression.

Such a showing, however, may not have its usual significance, in view of the fact that many machine tool builders could have taken much more business than was actually booked had they been able to make deliveries satisfactory to prospective buyers.

That tool buyers are anxious for shop equipment for immediate needs is shown by the brisk demand for good used tools, which are scarce and at a premium. Representatives of manufacturers attended machine tool auctions in the Chicago district in the past week, and bid high prices for tools available for early shipment.

The aviation industry is prominent in purchases of tools in the East. The Lycoming Mfg. Co., Williamsport, Pa., has continued buying. Its orders are expected to total in value about $200,000 to $250,000. The Eclipse Machine Co., East Orange, N. J., manufacturer of airplane starters, has made further purchases, its orders for the year having reached a large figure.

Railroad buying has been enlivened by large purchases by the Chesapeake & Ohio, which still has some tools on its list to place.

Export business has been a feature in the Cincinnati district. A large automobile manufacturer has placed an export order totaling about $100,000 for high production machines and a German company has ordered $50,000 to $60,000 worth of tools. A European automobile manufacturer is negotiating for considerable equipment, which probably will be bought within 30 days.

New York

NEW YORK, May 7.—Machine tool buying in this district in April was large. Some sales offices report that their total volume ran ahead of that in March, but others did not do so well. Inquiries are in good volume. The Lycoming Mfg. Co., Williamsport, Pa., has continued its purchasing of tools for the manufacture of airplane engines. It is estimated that its total purchases will amount to $200,000 to $250,000. The Eclipse Machine Co., East Orange, N. J., manufacturer of starters for airplanes, has also been doing additional buying. Its purchases so far this year will run into a large figure. Expansion in the uses of sheets and strip steel for manufacturing are indicated by a good demand for presses and heavy brakes.

Bids have been asked on general contract by American Aeronautical Corporation, Eleventh Avenue, Flushing, L. I., for new aircraft plant, including parts and assembling departments, aeronautical engineering school and airport, with hangars, shops and auxiliary structures on Manhasset Isle, near Port Washington, N. Y., to cost over $700,000 with equipment. Lockwood Greene Engineers, Inc., 100 East Forty-second Street, New York, is engineer.

Kohler Co., Kohler, Wis., manufacturer of sanitary ware, has purchased property at Long Island City, as site for a factory branch and distributing plant, to cost over $150,000 with equipment.

Prudential Ice & Coal Co., 1163 Herkimer Street, Brooklyn, has plans for a one-story ice-manufacturing plant, 100 x 200 ft., to cost about $85,000 with machinery. Charles P. Cannella, address noted, is architect.

Officials of Remington Arms Co., 25 Broadway, New York, have organized Hofgaard-Remington Corporation, to manufacture a new type of calculating machine, electrically operated, invented by Rolf Hofgaard, who will be an official of new company. Production will be carried out at Remington plant at Ilion, N. Y., where facilities will be provided for parts manufacture and assembling.

Damon Type Founders Co., 44 Beekman Street, New York, has leased buildings at 456 Greenwich Street and 130-36 Watt Street for new plant and will remove from present location.

Allied Die Casting Corporation, Skillman Avenue, Long Island City, has approved plans for four-story plant, 100 x 180 ft., to be occupied under lease, to cost more than $250,000. Present plant will be removed to new location and capacity increased. Shampan & Shampan, 188 Montague Street, are architects.

Seelig & Finkelstein, 66 Court Street, Brooklyn, architects, have plans for a three-story automobile service, repair and garage building, 30 x 190 ft., to cost about $100,000 with equipment.

Master Craftsman, Inc., 33-24 Lawrence Street, Flushing, L. I., manufacturer of furniture, has plans for five-story factory addition, to cost about $100,000 with equipment. Lockwood Greene Engineers, Inc., 100 East Forty-second Street, New York, is architect and engineer.

Holmes Airport, Inc., New York, care of E. H. Holmes, head of E. H. Holmes, 60 Wall Street, New York, investment securities, recently organized as a unit of General Aero Corporation, has work under way on new airport in Queens Borough, where 220-acre tract has been secured, to include hangars, repair shops, oil storage and other units, to cost more than $2,000,000 with equipment. Parent company has arranged for stock issue to total $4,500,000, to be used in part for carrying out project.

Bagues, Inc., 25 West Fifty-fourth Street, New York, manufacturer of wrought iron and bronze products, has leased part of building at 333 West Fifty-second Street for a new plant.

Benjamin Braunstein, 163-18 Jamaica Avenue, Jamaica, L. I., architect, has plans for a two-story automobile service, repair and garage building at Elmhurst, L. I., to cost about $150,000 with equipment.

Middlesex County Vocational School Board, Easton Avenue, New Brunswick, N. J., has awarded general contract to J. L. Snitzler, New Brunswick, for three-story addition to vocational school, to cost $260,000 with equipment. Alexander Merchant, 52 Paterson Street, is architect; Saul Shaw & Co., 24 Commerce Street, are engineers.

Skinner Brothers Mfg. Co., 140 Bayway, Elizabeth, N. J., manufacturer of unit heaters, ventilating equipment, etc., is planning to remove local plant to main works at St. Louis, where production will be concentrated.

Uneedaburner Corporation, care of F. H. Brinkerhoff, 19 Rossmere Place, Belleville, N. J., recently organized by Mr. Brinkerhoff and associates, has acquired former local plant of Eck Dynamo Co., foot of Mill Street, consisting of two and three-story factory, 320 x 395 ft., and will occupy in part for manufacture of line of patented oil burners, valves and kindred specialties. W. F. Bolte, East Orange, N. J., is also interested in new company.

Annandale Graphite Co., Annandale, N. J., is planning two-story and basement

addition, to cost over $35,000 with equipment.

National Harris Wire Co., Verona and Mount Prospect Avenues, Newark, manufacturer of wire products, nickel tubing, etc., occupying part of plant of Heller Brothers File Works, has taken over remainder of buildings for increased output. Company has purchased Connecticut Wire Co., Waterbury, Conn., and will consolidate with organization. Waterbury plant will be removed to Newark works, where production will be concentrated. Francis R. Harris is president.

Thermicron Corporation, 20 Bond Street, New York, has been incorporated to manufacture electric heating elements. These consist of nickel chromium imbedded in mica and sheathed in a protecting armor of light sheet steel. Manufacturing will be done at plant of Poloron Electric Mfg. Corporation, with which Thermicron Corporation is affiliated. Both companies are in market for steel and brass stampings, nickel chromium wire, etc.

Rich-Wil Equipment Corporation has been incorporated to take over Richards-Wilcox Mfg. Co. of New York, 85 Walker Street, a subsidiary of company of same name at Aurora, Ill. Business of New York company is largely in elevator equipment.

New England

BOSTON, May 6.—Another lull in machine tool buying is reported by dealers. This slowing down is attributed to the inability to make early deliveries rather than to any slowing down in New England industry. Sales the past week included five 14-in. lathes to a Massachusetts shop, an open side planer to a Turners Falls, Mass., plant, and a Brown & Sharpe shaper to a Connecticut plant. The used tool market is even quieter than the new. Dealers are getting a few new inquiries for high-priced equipment, but no lists are in sight.

Pneumatic Drop Hammer Co., Boston, reports shipments for 1929 to date as 80 per cent ahead of last year. Company has advanced prices 10 per cent. Recent sales include three large hammers to a Montreal manufacturer and orders from Indiana, Ohio, Michigan and Connecticut for 600 to 900-lb. hammers. It is 60 to 90 days behind on deliveries and has sufficient bookings to assure capacity operations well into third quarter. Recent inquiries are from Italy, Germany, France and England.

City of Springfield, Mass., will close bids May 16 on manual training and miscellaneous equipment. H. L. Dorman is superintendent of public buildings.

Hartford Special Machinery Co., 287 Homestead Avenue, Hartford, Conn., has awarded general contract for a one-story addition, 30 x 60 ft., and machine foundations. Buck & Sheldon, 60 Prospect Street, Hartford, are engineers.

Danbury Printing Co., 39 Foster Street, Danbury, Conn., is having plans prepared for a one and two-story plant, 45 x 150 ft., for which motors and conveying equipment are required.

Eastern Mfg. Co., South Brewer, Me., will build a digester plant addition, 27 x 30 ft., a one-story, 100 x 103 ft., pulp dryer plant addition, and make other improvements.

O. M. Higgins, Park Street, Attleboro, Mass., architect, is completing plans for a one-story and basement addition, 60 x 140 ft., for Mossberg Pressed Steel Co., 81 West Street, Attleboro.

Mylchreest & Reynolds, 238 Palm Street, Hartford, Conn., have started work on alterations to plant of Arrow Electric Co., Hart & Hegeman division, 103 Hawthorne Street, Hartford. Electrical equipment will be used.

Blake Mfg. Co., Roland Avenue, Springfield, Mass., manufacturer of flashlights and metal novelties, has taken a 10-year lease of its manufacturing quarters. Purchase of new equipment is contemplated.

Worcester Gas Light Co., Worcester, Mass., has been granted a permit to erect a generator plant, gas machinery plant, boiler plant and make other improvements to local works. Arthur C. Fay is superintendent.

Plans have been filed by Ceco Mfg. Co., Chapman Street, Providence, R. I., manufacturer of radio equipment, for four-story addition, to cost over $90,000 with machinery.

Crane Co., South Avenue, Bridgeport, Conn., with headquarters at Chicago, has awarded general contract to T. J. Pardy Construction Co., 1481 Seaview Avenue, Bridgeport, for one-story factory branch and distributing plant, 125 x 500 ft., to cost more than $150,000 with equipment.

Scott & Williams, Inc., Union Avenue, Laconia, N. H., manufacturer of knitting machinery and parts, has awarded general contract to Temple-Crane, Inc., 80 Federal Street, Boston, for four-story addition, 60 x 180 ft., with one-story boiler plant, to cost about $130,000 with equipment.

Lux Clock Mfg. Co., Johnson Street, Waterbury, Conn., manufacturer of clocks and clock mechanisms, is having plans drawn for a four-story addition, 45 x 150 ft., to cost $100,000 with equipment. Thomas M. Freney, Waterbury, is architect.

H. K. Porter, Inc., Ashland Avenue, Everett, Mass., manufacturer of wire cutters, bolt clippers and kindred mechanical equipment, is having plans drawn for a one-story addition, 80 x 120 ft., to cost $55,000 with equipment. J. R. Worcester Co., 79 Milk Street, Boston, is architect.

Skayef Ball Bearing Co., Hartford, Conn., is said to be planning one-story addition, to cost over $40,000 with equipment.

Peoples Light & Power Corporation, Burlington, Vt., is planning construction of steel tower transmission line from Essex Junction to Montpelier, Vt., about 27 miles, to cost more than $350,000.

Bethlehem Shipbuilding Corporation, East Howard Street, Quincy, Mass., has awarded general contract to Wilson & Tomlinson, 201 Devonshire Street, Boston, for one and two-story machine shop addition at Fore River shipyard, 90 x 225 ft., to cost about $65,000 with equipment.

The Crane Market

INQUIRY for electric overhead cranes is rather light, but there is some substantial business pending, including 10 overhead cranes for the Western Electric Co. Inquiry for locomotive cranes is increasing and some business has been placed in the past week.

Low bidder for furnishing Milwaukee a new car ferry terminal on Jones Island was the Orton Crane & Shovel Co., quoting $16,468 for a 30-ton, steam-driven locomotive crane with an alternate bid of $16,480 for gasoline operated. The Link Belt Co. was low on a 55-in. magnet.

Among recent purchases are:

Merritt-Chapman & Scott Corporation, 17 Battery Place, New York, 25-ton locomotive crane from Ohio Locomotive Crane Co.

Phoenix Utility Co., New York, 25-ton locomotive crane from Ohio Locomotive Crane Co.

New York Central Railroad, New York, 20-ton electric overhead crane from Bedford Foundry & Machine Co.

I. D. Brent Co., Flint, Mich., steam-driven, crawl-tread crane from Orton Crane & Shovel Co.

Mersey Paper Co., Liverpool, Nova Scotia, electrically-operated pier crane from Orton Crane & Shovel Co.

National Tube Co., Lorain, Ohio, six 20-ton four-hook cranes from Morgan Engineering Co.

Newton Steel Co., Youngstown, 11 overhead traveling cranes for new sheet mill at Monroe, Mich., from Alliance Machine Co.

Buffalo

BUFFALO, May 6. — Kelsey-Hayes Wheel Corporation, Buffalo, has been organized with capital of $4,020,500 to take over and consolidate Wire Wheel Corporation of America, 1700 Elmwood Avenue, Buffalo, and Kelsey-Hayes Wheel Co., 3600 Military Avenue, Detroit, manufacturers of wire wheels, spokes, hubs, etc. New organization will continue operations at present works and plans expansion.

Board of Education, Binghamton, N. Y., plans installation of manual equipment in new four-story high school to cost $650,000, for which bids are being asked on general contract. A. T. Lacey & Son, Press Building, are architects; E. W. Prentice, City Hall, is engineer.

National Lime, Cement & By-Products Corporation, Mutual Building, Buffalo, has work under way on new plant near Tuscumbia, Ala., to cost about $275,000 with equipment, and is said to be arranging for quarrying equipment, crushing, grinding, conveying and other machinery.

John J. Manos, 117 Glen Street, Glens Falls, N. Y., and associates have organized Common Sense Accurate Gauge Co., to operate a plant at Cortland, N. Y., for manufacture of gages and other precision equipment. Peter J. Seferlis, 23 Elm Street, Cortland, is also interested in new organization.

Buckeye-Peerless Radio Corporation, Rochester, N. Y., is being formed to take over and consolidate United Reproducers Corporation, with local plant on Leighton Avenue, and Buckeye Incubator Co., Springfield, Ohio. New company will specialize in manufacture of radio sets, and plant No. 2 of Buckeye company will be devoted exclusively to production of cabinets and for assembling finished radio sets. Increased production will be carried out. Merger will also include Precision Products Co., Ann Arbor, Mich., lately acquired by United Reproducers Corporation, and plant there will be continued for radio receiver manufacture. A. R. Hill will be one of heads of new corporation.

Aerial Service Corporation, Hammondsport, N. Y., manufacturer of airplanes, has changed its name to Mercury Aircraft, Inc. Company will increase production of commercial aircraft.

Schwenzer Tool & Die Co., 1754 Main Street, Buffalo, has been incorporated to manufacture tools, dies and special machinery. It contemplates construction of a new building within a year, and will then be in market for additional machinery.

Philadelphia

PHILADELPHIA, May 6.—Contract has been let by Atwater Kent Mfg. Co., Philadelphia, manufacturer of radio equipment, to Moester & Co., Second and Bristol Streets, for one-story addition to cost about $25,000.

Reading Co., Reading Terminal, Philadelphia, has awarded general contract to Hughes-Foulkrod Co., Schaff Building, for three-story equipment storage and distributing plant at Reading, Pa., to cost about $800,000 with handling apparatus.

Heintz Mfg. Co., Front Street and Olney Avenue, Philadelphia, manufacturer of steel automobile bodies, has plans for a one-story addition, to cost about $65,000 with equipment.

Ellwood Ivins Steel Tube Works, Inc., has been formed with capital of $300,000 by Ellwood Ivins and associates to take over and expand Ellwood Ivins Tube Works, with plant at Oak Lane, Montgomery County, near Philadelphia. New company will specialize in steel, aluminum, brass, bronze, copper and other metal tubing. John B. Cording is treasurer.

Gulf Refining Co., Sydenham Avenue and Locust Street, Philadelphia, has awarded general contract to Cramp & Co., Denckla Building, for two one-story additions for burner and filter units, to cost about $150,000 with equipment. Headquarters of company are in Frick Annex, Pittsburgh. Edward B. Lee, Chamber of Commerce Building Pittsburgh, is architect.

Funk Printing Press Co., Aldene Avenue, Roselle, N. J., has plans for new plant on 15-acre tract at Princeton Junction, N. J., to cost more than $80,000 with equipment. Present works will be removed to new location and capacity increased. A housing development will be carried out for employees. Nelson E. Funk is president.

Audio Vision Appliance Co., Camden, N. J., has been organized by officials of Victor Talking Machine Co., Camden, and Radio Corporation of America, Woolworth Building, New York, as manufacturing unit of consolidation of two companies. New organization will take over Victor company plant and will increase facilities for manufacture of popular-priced combination radio-talking machines. Appliances and equipment heretofore produced by General Electric Co., Schenectady, and Westinghouse Electric & Mfg. Co., East Pittsburgh, for Radio Corporation, under its patents, will be manufactured by new company.

Board of Trustees, Swarthmore College, Swarthmore, Pa., is planning new power plant to cost about $100,000 with equipment.

McClintic-Marshall Co., Pottstown, Pa., has acquired 45-acre tract adjoining local steel fabricating plant, with group of one-story mill buildings, heretofore used by Pottstown Iron Co., and will occupy for expansion.

Aircraft & Airways, Inc., 1420 Farmers Bank Building, Pittsburgh, F. Lemoyne Page, president, plans new hangars, with repair and reconditioning shops at airport at Gettysburg, Pa., to cost about $100,000 with equipment.

Ad-Tissue Corporation, Wilmington, Del., has taken over former mill of Kiamensi Woolen Co., Stanton, consisting of large plant on 15-acre tract and will remodel for manufacture of tissue paper stocks.

City Council, Bethlehem, Pa., has approved plans for hangar at municipal airport, 100 x 120 ft., with repair and reconditioning facilities, to cost about $40,000.

J. G. Brill Co., Philadelphia, manufacturer of electric street cars and trucks, self-propelled gas-electric and mechanical-driven cars for steam railroads, and Brill steel dining cars, has organized Associated Products Division, under management of J. C. Robb, with F. O. Paul, formerly automotive service manager, as assistant. New division will control departments of research and sales extension, also manufacture and distribution of new products.

Milwaukee

MILWAUKEE, May 6.—Buying of machine tools continues active, although individual orders are mainly for single items. Some shops have been able to make headway in deliveries, but in general the industry is still far behind orders, with the scarcity of skilled labor making impossible any further stepping up of production.

Due largely to the absorption of labor by metal-working shops, Milwaukee employment at the beginning of May reached the record figure of 43,891, a gain of 665 over the previous month, and comparing with 36,871 a year ago.

M. E. McCaffrey, secretary Board of Regents, University of Wisconsin, Madison, will be ready for bids after May 15 for construction of new mechanical engineering building, three stories, 230 x 250 ft., designed by Arthur Peabody, State architect. Appropriation is $577,000.

Lubenow Mfg. Co., 592 First Avenue, Milwaukee, manufacturer of machine screws, has started work on new shop, 84 x 100 ft., one story and part basement. Meredith Brothers, 253 Washington Street, are general contractors. Estimated cost, with equipment, is $40,000.

Globe Electric Co., 20 Keefe Avenue, Milwaukee, has awarded contract to Worden-Allen Co., for adding second story to battery shop unit, 30 x 100 ft.

J. I. Case Threshing Machine Co., 700 State Street, Racine, Wis., is taking bids for alterations and additions at branch warehouse, assembly and service plant in Billings, Mont., to cost about $80,000.

Paper Converting Machine Co., North Quincy and Day Streets, Green Bay, Wis., has placed general contract with J. H. Geniesse Co., 820 South Jackson Street, for one-story addition, 80 x 110 ft.

Juneau County Highway Committee, Mauston, Wis., is taking bids until May 14 for machine shop, 50 x 100 ft., for servicing County highway construction and maintenance equipment. Hans Christensen is commissioner.

Work has been started by Milwaukee Pattern & Mfg. Co., 1195 Thirtieth Street, on a two-story shop addition, 45 x 60 ft.

Hulbert Brothers, 1008 Herrick Avenue, Racine, Wis., will erect one-story building, 125 x 132 ft., costing about $65,000, for joint occupancy with Racine branch of International Harvester Co. Automotive service equipment will be required by both occupants.

Anton J. Scovia, village clerk, Ontonagon, Mich., closes bids May 17 for construction of waterworks pumping station and electric power distributing station. Green & Walraven, Iron River, Mich., are consulting engineers.

Pressed Steel Tank Co., Milwaukee, has purchased assets of Seamless Steel Products Corporation, same city, manufacturer of cylinders, tanks, and other seamless steel products. Business will be operated by purchasing company as a subsidiary.

South Atlantic

BALTIMORE, May 6.—Easton Utility Commission, Easton, Md., has plans for addition to municipal electric light and power plant to cost about $35,000. J. S. McDaniel is secretary.

War Department, Washington, will soon take bids for group of 25 buildings at powder works, Picatinny Arsenal, Dover, N. J., to cost $300,000; also for project at Mitchel airfield, New York, including hangars, $79,000; field shop, $81,000; equipment storage and distributing building, $38,000, and other structures to cost $100,000.

Norfolk & Western Railway Co., Norfolk, Va., is planning extensions and improvements in engine house and shop at Bluefield, W. Va., to cost more than $30,000. W. P. Wiltsee, Roanoke, Va., is chief engineer.

Southern States Iron Roofing Co., Savannah, Ga., has leased building at Newark, N. J., formerly used as freight terminal by Erie Railroad, for factory branch and distributing plant. An assembling department will be installed.

Select Tire Service Co., care of M. R. Marsh, Builders' Building, Charlotte, N. C., architect, has plans for two-story service and distributing plant, 100 x 100 ft., to cost about $80,000 with equipment.

Southern Chair & Novelty Corporation, Martinsville, Va., has awarded general contract to Finley & McCoy, Martinsville, for three-story plant, 80 x 240 ft., to cost about $75,000 with equipment. Louis P. Smithey, 112 Kirk Avenue, West Roanoke, Va., is architect.

Southern Natural Gas Corporation, care of Ford, Bacon & Davis, Inc., 115 Broadway, New York, engineer, has authorized construction of a pipe line from natural gas fields near Monroe and Richland, La., to Atlanta, Ga., about 1400 miles. Project will cost about $35,000,000 with booster stations and other facilities.

Curtiss-Caproni Corporation, affiliated with Curtiss Aeroplane & Motor Corporation, Kail Street, Buffalo, C. M. Keys, president of both companies, is reported planning works at Baltimore municipal airport, for production of heavy type seaplanes and other giant aircraft, initial units to cost over $500,000.

Torsch-Summers Co., 1501 Russell Street, Baltimore, canned goods, has awarded general contract to Frainie Brothers & Haigley, 19 West Franklin Street, for one-story storage and distributing plant, 100 x 325 ft., to cost over $100,000 with conveying and other handling equipment.

Standard Paper Mfg. Co., Richmond, Va., has awarded general contract to Allen J. Saville Co., Inc., Electric Building, for first unit of expansion program at No. 3 mill, to double present capacity, to cost more than $350,000 with equipment. Lee, Smith & Van Dervoort, Sixth and Franklin Streets, are architects.

Detroit

DETROIT, May 6.—Work has begun by Lansing Stamping & Tool Co., Lansing, Mich., on one-story addition, for which general contract recently was let to Reniger Construction Co., Lansing, to cost $100,000 with equipment.

Auto Specialties Mfg. Co., St. Joseph, Mich., has plans for one-story addition, to cost $150,000 with machinery. F. E. Davidson, 53 West Jackson Boulevard, Chicago, is architect and engineer.

Shaw-Walker Co., Muskegon, Mich., manufacturer of metal desks and other furniture, has superstructure under way for five-story addition, to cost $160,000 with equipment. Billingham & Cobb, 120 Woodward Avenue, Kalamazoo, Mich., are architects.

Wilcox-Rich Corporation, Saginaw, Mich., is carrying out an expansion program in airplane engine valve division to cost about $150,000, and will develop special department for production of patented salt-cooled valves for aircraft motors.

Board of Education, Petoskey, Mich., is said to be planning installation of manual training equipment in new high and grade school to cost about $200,000, for which plans will be drawn by Warren S. Holmes Co., Capitol Savings & Loan Building, Lansing, Mich., architect.

Detroit Paper Products Co., Domine Street and Grand Trunk Railroad, Detroit, has work under way to double present capacity of corrugated paper boxes and other corrugated board products, to cost more than $100,000.

A. A. Schantz, president, Detroit & Cleveland Navigation Co., Detroit, and associates are organizing American-Dornier Co. to establish plant in this vicinity to manufacture all-metal flying boats, under patents and manufacturing rights secured from Dornier-Wahl Co., Friedrichshafen, Germany. Dr. Claude Dornier, head of German organization, will be identified with new company.

Checker Cab Mfg. Corporation, Kalamazoo, Mich., is planning for early erection of new plant unit, primarily for taxicab body manufacture, present plant to be removed to new building and capacity increased. Work will be carried out in connection with expansion program to cost about $1,000,000.

Plans are under way by Walker & Co., 88 Custer Street, Detroit, and Bellows Claude Neon Co., with local plant, both specializing in manufacture of outdoor electric signs and displays, for consolidation. Expansion program will be carried out. First-noted company is disposing of stock issue to total $3,700,000, to be used in connection with merger.

St. Louis

ST. LOUIS, May 6.—Shamrock Oil & Gas Co., 4158 Geraldine Avenue, St. Louis, has plans for two-story oil storage and distributing plant, 200 x 275 ft., to cost more than $100,000 with equipment.

City Council, Muskogee, Okla., has engaged Austin Co., 16112 Euclid Avenue, Cleveland, engineer and contractor, to prepare plans for municipal airport on 400-acre tract including hangars, repair shops and other units, to cost over $100,000 with equipment.

Chicago, Rock Island & Pacific Railway Co., LaSalle Street Station, Chicago, has awarded general contract to United Engineers & Constructors, Inc., 1401 Arch Street, Philadelphia, for one-story car repair shop at works at El Reno, Okla., 70 x 400 ft., to cost more than $175,000 with equipment. A 15-ton traveling crane will be installed. W. H. Peterson is chief engineer.

Western States Public Utilities Co., Central City, Neb., is considering new electric light and power plant at Atkinson, Neb., to cost $60,000. Betts-Blumer Engineering Co., Kearney, Neb., is engineer.

John Deere Tractor Co., Moline, Ill., has plans for four-story factory branch and distributing plant at Sidney, Neb., to cost over $80,000 with equipment.

Marquette Cement Mfg. Co., Cape Girardeau, Mo., has plans for extensions and improvements in local mill to double present capacity, to cost more than $600,000. Company is also said to be planning new storage and distributing plants at St. Louis and Memphis, Tenn., each to cost more than $75,000 with equipment. Headquarters are in Marquette Building, Chicago.

Wright Aeronautical Corporation, Paterson, N. J., has leased a factory at St. Louis from Aluminum Goods Mfg. Co., for assembling plant for Gypsy aircraft engines for light planes. Facilities will be provided for 200 engine units per month, to cost about $150,000.

State Board of School Administration, Topeka, Kan., is planning new one-story industrial school at Olathe, Kan., to cost about $35,000. C. D. Cuthbert, State House, Topeka, is State architect, in charge.

Cleveland

CLEVELAND, May 6.—Machine tool sales are fair, holding up to the volume of the past few weeks, but below the March peak. Business is well distributed, although the automotive industry is not showing a great deal of activity at present. Orders the past week have been mostly for single machines. A fair amount of business is coming from the airplane industry. Deliveries, while not getting worse, show no signs of improvement. This situation has stimulated demand for used tools, which are said to be bringing good prices.

Contract has been let by Clark Controller Co., 1146 East 152nd Street, Cleveland, manufacturer of electric controls, switches, etc., to J. L. Hunting Co., Guarantee Title Building, for one-story addition, 40 x 125 ft., to cost about $60,000 with equipment.

Cleveland Tractor Co., Euclid Avenue, Cleveland, manufacturer of crawler tractors, parts, etc., has disposed of stock issue totaling $3,072,000, part of fund to be used for expansion.

Wilbur Watson & Associates, 4614 Prospect Avenue, Cleveland, architects and engineers, have filed plans for two-story automobile service, repair and garage building, 100 x 150 ft., to cost $135,000 with equipment.

National Lamp Works of General Electric Co., Nela Park, Cleveland, has awarded general contract to A. M. Higley Co., Plymouth Building, for one-story addition, 100 x 140 ft., to cost over $85,000 with equipment.

MacComber Steel Co., Canton, Ohio, is reported planning one-story addition to cost more than $75,000.

Massillon Rivet & Mfg. Co., Massillon, Ohio, has plans for one-story addition, 40 x 100 ft., to cost about $50,000 with equipment.

National Supply Co., Toledo, Ohio, manufacturer of oil, water and gas well equipment and supplies, is planning removal of branch plant at West Chicago, Ill., to Toledo, where production will be concentrated. Capacity at Toledo works will be increased.

Thomas Stoker Co., 5906 Park Avenue, Cleveland, has been incorporated and has increased its capital stock from 1000 to 2500 shares, proceeds to be used for additional working capital. Company manufactures stokers and allied equipment. No plant expansion is contemplated at present.

Chicago

CHICAGO, May 6.—Sales of machine tools show a slow but definite trend downward. However, new inquiry looks more promising than a week ago. The Rock Island will buy a 10-ft. power bending brake, a 2-in. drill grinder and a 36-in. rip saw. It is reported that the Western Electric Co. is preparing a large list for its Baltimore plant and the trade is expecting a list from the Union Pacific. Many buyers, handicapped by deferred deliveries on new equipment, are entering the used tool market for the first time. Many are attending auctions and buying direct at prices that are unusually high. The shortage of good used tools is acute.

Prices for one line of disk grinders will be advanced May 15 and the trade expects higher quotations on other lines of machine tools before June 1.

Bids have been asked on general contract by Chicago Screw Co., 1026 South Homan Avenue, Chicago, for two-story top addition, to cost $140,000 with equipment. J. B. Fischer, 140 South Dearborn Street, is architect.

Cornstalk Products Co., Danville, Ill., manufacturer of paper pulp from cornstalks and other farm waste, is reported to be planning expansion and improvements, to cost about $400,000 with equipment. W. Jule Day is chairman of board.

Magnavox Co., San Francisco, manufacturer of radio loud speakers and other radio apparatus, has arranged for branch plant at 3931 South Winchester Avenue, Chicago, where about 32,000 sq. ft. floor space in unit E, Central Manufacturing District, has been leased.

Coco-Cola Co., 1032 South Crawford Avenue, Chicago, has asked bids on general contract for two-story bottling, storage and distributing plant, to cost $100,000 with equipment. Quinn & Christianson, 360 North Michigan Avenue, are architects.

Chamberlain Machine Works, East Fourth Street, Waterloo, Iowa, has plans for a one-story addition, 65 x 100 ft., to cost about $50,000 with equipment.

Northwestern Public Service Co., Huron, S. D., will proceed with construction of addition to steam-operated electric power plant at Mitchell, S. D., with installation of additional equipment, to cost more than $350,000.

Poor & Co., Inc., 80 East Jackson Boulevard, Chicago, manufacturer of railroad equipment and supplies, has purchased Rail Joint Co., 165 Broadway, New York, with main plant at Troy, N. Y., and will consolidate. Troy works will be continued and capacity increased. Purchasing company also operates Canton Forge & Axle Co., Canton, Ohio; Maintenance Equipment Co., Chicago, and Vermilion Malleable Iron Co., Hoopeston, Ill. A note issue of $3,500,000 is being

sold, fund to be used in part for purchase of Rail Joint Co., and for expansion. Fred A. Poor is president.

Yale Oil Corporation, Billings, Mont., D. D. Gibson, head, has plans for new oil refinery near city limits, to cost about $100,000 with equipment.

McGraw Electric Co., Sioux City, Iowa, and Omaha, Neb., has purchased Bussman Mfg. Co., St. Louis, manufacturer of fuses, etc., and Waters-Genter Co., Minneapolis, Minn., specializing in electric toasters and kindred products, and will consolidate. Expansion is planned. McGraw company has disposed of electrical supply and equipment business at Sioux Falls and Omaha to Westinghouse Electric & Mfg. Co., East Pittsburgh.

Standard Oil Co. of Indiana, 910 South Michigan Avenue, Chicago, has approved construction of three-story storage and distributing plant at Tilton, near Danville, Ill., to cost about $100,000 with equipment.

Minnesota Radiator Corporation, Duluth, Minn., has been incorporated to take over local plant and business of Minnesota Radiator Co. It will manufacture cast iron radiators for heating purposes. Harry C. Strong, Jr., is secretary and manager.

Steel Mill Products Co., 330 South Wells Street, Chicago, has been appointed district sales agent for mechanical seamless steel tubing manufactured by Appleton Steel Tube Co., Appleton, Wis.

Taylor Forge & Pipe Works, is new name adopted by American Spiral Pipe Works, Chicago, Ill.

Brammer Washing Machine Co., Davenport, Iowa, has been reorganized and has taken over assets and property of H. F. Brammer Mfg. Co., 1441 Rockingham Road, whose plant it has been occupying. New financing has been arranged for increased production.

Indiana

INDIANAPOLIS, May 6.—Contract has been let by Marmon Motor Car Co., West Morris Street, Indianapolis, to H. K. Ferguson Co., Cleveland, for one-story addition to Plant No. 2, to cost over $600,000 with equipment.

Banner Rock Division of Johns-Manville Corporation, Alexandria, manufacturer of insulation products, is said to have plans for two additions, one and three stories, 120 x 160 ft., and 50 x 190 ft., to cost more than $100,000 with equipment. Headquarters are at Madison Avenue and Forty-first Street, New York.

John Baumgarth Co., 1219 Washington Boulevard, Chicago, manufacturer of advertising specialties, has asked bids on general contract for new plant at South Bend, one story and basement, 300 x 380 ft., with office, 85 x 200 ft., to cost more than $250,000 with equipment. Frank D. Chase, Inc., 720 North Michigan Avenue, Chicago, is architect and engineer.

Board of Education, Gary, plans installation of manual training equipment in new Roosevelt High School to cost $900,000, for which bids are being asked until May 14. William B. Ittner, Inc., 911 Locust Street, St. Louis, is architect.

Board of Directors, Indiana State Normal School, 217 North Seventh Street, Terre Haute, will soon take bids on general contract for one-story power plant, to cost about $70,000 with equipment. Johnson, Miller, Miller & Leager, 919 Ohio Street, are architects and engineers.

Cincinnati

CINCINNATI, May 6.—Machine tool bookings continue at a high level and some builders report a slight improvement last week. Interest has centered principally on foreign business, which has been of sizable proportions. A large automobile manufacturer has placed an export order with a local company for high production machines amounting to more than $100,000, and a German company has purchased tools involving between $50,000 and $60,000. A leading European automobile maker is negotiating for considerable equipment, which probably will be bought in the next 30 days.

Domestic orders have been mostly for one or two machines each; the volume, however, has been substantial. The Chesapeake & Ohio has closed for some of the large tools on its list and will buy the remainder in the next week or two. Numerous carriers are in the market for a few tools, but are slow in placing orders.

Deliveries continue long deferred in many lines, and some companies are not able to make deliveries before July and August. Machine tool plants are maintaining operations at capacity and are running over time in some departments.

Holliday Steel & Iron Co., Dayton, Ohio, has awarded general contract to Charles Shook, Inc., Third National Bank Building, for one-story plant, to cost about $100,000 with equipment.

Heekin Can Co., Sixth Street, Cincinnati, manufacturer of tin cans and containers, has let general contract to Ferro Concrete Construction Co., Third and Elm Streets, for three-story addition, 80 x 195 ft., to cost more than $150,000 with equipment.

Dayton Light, Heat & Power Co., Dayton, Ohio, will soon take bids for one-story addition to power plant, to cost about $200,000 with equipment. Company is operated by Columbia Engineering & Management Corporation, 314 West Fourth Street, Cincinnati, and engineering department of last noted will prepare plans.

Lovell J. Morris, Volunteer Building, Chattanooga, Tenn., and associates have organized Farmer & Co., to establish and operate plant for new type of electric-welded railroad crossing and other railroad equipment.

City Council, Nashville, Tenn., is said to be planning establishment of municipal airport on 200-acre tract near Murfressboro, to include hangars, repair shops, oil storage and other buildings to cost more than $80,000 with equipment.

Kentucky Utilities Co., Louisville, is reported planning new artificial gas plant at Shelbyville, Ky., to cost more than $200,000 with equipment.

Central Steel & Wire Co., West Monument Avenue, Dayton, Ohio, is planning one-story addition, 50 x 220 ft., to cost about $80,000 with equipment. Bids will soon be asked.

Common Council, Tippecanoe City, Ohio, is considering extensions and improvements in municipal electric light and water plant, including installation of additional machinery, to cost about $100,000. R. S. Benham is general superintendent, in charge.

International Harvester Co., 606 South Michigan Avenue, Chicago, will soon begin four-story addition to factory branch and distributing plant at Memphis, Tenn., to cost about $90,000 with equipment. W. C. Maney is local manager.

Pittsburgh

PITTSBURGH, May 6.—Machine tool business in this district has not shown much improvement the past week, and while the volume is good, buying is hardly up to expectations. There is a fair amount of new inquiry, but orders are not being placed immediately, thus adding to the pending business which is considerable. Most of the tools required for the shop additions of the Chesapeake & Ohio Railway at Huntington, W. Va., and Russell, Ky., have been placed and awards are being made against the second quarter list of the Westinghouse Electric & Mfg. Co.

The Newton Steel Co., Newton Falls, Ohio, is buying for its new plant near Monroe, Mich., and has recently purchased several cranes. The National Tube Co. is also beginning to show more interest in the requirements for expansion at McKeesport, Pa., and Lorain, Ohio. Recent additions to steel plant developments in this and nearby districts include the Bethlehem Steel Co. for its Cambria works, Johnstown, Pa., which will require an expenditure of more than $10,000,000 during the year.

Plans are being drawn by Standard Propeller Co., Homestead, Pa., manufacturer of airplane propellers, for three-story plant, 125 x 240 ft., to cost about $175,000 with equipment. A. G. Wickersham, 135 East Eighth Avenue, is architect.

Oil Well Supply Co., Clark Building, Pittsburgh, manufacturer of oil well drilling tools and equipment, has purchased controlling interest in Wilson-Snyder Mfg. Co., Braddock, Pa., manufacturer of pumps, etc. Wilson-Snyder Mfg. Corporation has been formed to take over property, with capital of $600,000, and will operate as separate unit. Expansion will be carried out at Braddock plant, including erection of one-story machine shop to cost about $60,000.

National Forge & Ordnance Co., Irvineton (P. O. Irvine), Pa., has awarded general contract to Barton R. Shover, Oliver Building, Pittsburgh, for one-story plant unit, 150 x 300 ft., to cost over $100,000 with equipment.

Officials of Taylor Aircraft Corporation, Rochester, N. Y., have organized Taylor Brothers Aircraft Corporation, with capital of $100,000, to construct and operate plant at Bradford, Pa., previously announced in these columns, to cost $50,000. New company is headed by C. G. Taylor and L. S. Bannister, Bradford.

Lawrence Motor Co., Mercer Street, New Castle, Pa., will take bids on revised plans for four-story service, repair and garage building to cost about $150,000 with equipment. W. C. Eckles Co., Lawrence Savings & Loan Building, is architect.

United States Chain & Forging Co., Union Trust Building, Pittsburgh, has awarded contract to Fort Pitt Bridge Works, Oliver Building, for one-story addition to branch plant at York, Pa., to cost about $50,000 with equipment.

Pennsylvania Pump and Compressor Co., Easton, Pa., has appointed Carpenter & Byrne, 4 Smithfield Street, Pittsburgh, sales representatives in Pittsburgh district.

Gulf States

BIRMINGHAM, May 6.—Dallas Power & Light Co., Dallas, Tex., has begun expansion program at steam-operated electric power plant to include addition with machinery to increase capacity from 57,500 to 82,500 kw., estimated to cost $2,500,000.

Pecos Valley Gas Co., Artesia, N. M., is disposing of bond issue of $475,000, a considerable part of fund to be used for construction of new pipe line from Artesia to Roswell, N. M., and vicinity, about 41 miles, for natural gas supply, and for other lines at Lake Arthur, Dexter and Hagerman, N. M., including booster stations and other facilities.

Board of Works, Jacksonville, Fla., will receive bids until May 27 for electrically-operated centrifugal pumping machinery, capacity 20,000 gal. per min., with accessories, for municipal water service. H. J. Klutho and C. V. Imeson, 509 Clark Building, are engineers.

American Cyanamid Co., 535 Fifth Avenue, New York, has plans for phosphoric acid plant at Hillsborough Bay, near Tampa, Fla., where tract of 265 acres recently was acquired, to cost about $2,500,000 with machinery. Company will also develop new phosphate deposits at Sidney, about 20 miles from Tampa, with mining, conveying, loading and other equipment, latter project to cost over $250,000.

Port Everglades Refining Co., care of Sholtz, Green & West, 220 South Beach Street, Daytona Beach, Fla., attorneys, recently organized, is said to have contracted with Fisher-Williams Corporation, 103 Park Avenue, New York, general contractor, for new oil refinery at Fort Lauderdale, Fla., to cost more than $250,000 with equipment.

Leonard Spark Plug Co., Inc., St. Petersburg, Fla., recently formed by Caleb Leonard, St. Petersburg, and associates, has leased local property for initial plant, to develop capacity of about 1000 spark plug units daily.

Magnolia Gas Co., Dallas, Tex., operating natural gas properties, has authorized construction of pipe line from gas fields to San Antonio, Tex., and vicinity, about 90 miles, to furnish 30,000,000 cu. ft. daily to San Antonio Public Service Co., which has contracted for supply. Project is reported to cost over $1,000,000 with booster equipment and facilities.

Harlingen Independent School District, Harlingen, Tex., plans installation of manual training equipment in new two-story high school to cost $250,000, for which bids will be asked at once on general contract. Dewitt & Washburn, Kirby Building, Dallas, Tex., are architects.

General Motors Truck Co., General Motors Building, Detroit, has acquired additional property at New Orleans and is said to be planning new factory branch, storage and service plant, to cost about $100,000 with equipment.

Canada

TORONTO, May 6.—The machine tool market continues steady, with sales at a satisfactory level and the volume of prospective business fairly large. Little demand is reported for new industrial works, but building programs indicate a good future call for general equipment. Small lists are appearing from time to time from the Canadian National and Canadian Pacific railroads for shop replacements.

Procter & Gamble Co. of Canada, Ltd., Hamilton, Ont., will build an addition to its plant to cost $200,000. E. J. Whitcher, care of Cincinnati office of company, is purchasing agent.

Ratepayers of Penetanguishene, Ont., have carried a by-law for addition to plant of Dominion Stove & Foundry Co. to cost $25,000. New equipment will be purchased.

McDonald Wire Goods Co., Ltd., Waterloo, Que., has awarded contract to Cecil Carpenter Co., 3 Craig Street, East, Montreal, for one-story foundry, 85 x 217 ft.

Bids will be called about middle of June for construction of a municipal power plant at Hull, Que., to cost $50,000. Theodore Lanctot, City Hall, is city engineer.

Canadian General Electric Co., Park Street, Peterborough, Ont., is receiving bids for the construction of a power house there. L. B. W. Magie is works engineer.

Having installed a $40,000 water pumping plant at Taber, Alberta, Canadian Pacific Railway Co. has found this to be inadequate and now will bring total expenditure to $100,000 by installation of a second pump and filtration system. Construction will start early in summer.

Pacific Coast

SAN FRANCISCO, May 2.—Fraser Gas Furnace, 445 South Joaquin Street, Stockton, Cal., manufacturer of gas furnaces and equipment, has rejected bids for one-story plant, totaling 45,000 sq. ft. floor space, and will have revised plans drawn. It is estimated to cost about $50,000. Ralph P. Morrell, Union Building, is architect.

Ford Motor Co., 2060 East Seventh Street, Los Angeles, will soon award general contract for new assembling plant at Long Beach, Cal., consisting of main one-story unit, 315 x 930 ft., two-story storage and distributing plant, 100 x 400 ft.; two-story power plant, 83 x 100 ft.; oil house, 61 x 113 ft., and two-story office, 80 x 100 ft., to cost about $1,500,000 with machinery. Albert Kahn, Marquette Building, Detroit, is architect and engineer. B. R. Brown is chief engineer of construction department of company.

Figadota Canneries, Inc., operated by Riverside Development Co., 530 West Sixth Street, Los Angeles, plans new canning plant near Perris, Cal., with automatic canning machinery, conveying equipment, etc., to cost over $160,000. B. K. Rusler is president.

Engineering Department, City Port Commission, Oakland Bank Building, Oakland, Cal., has plans for all-steel hangar, 120 x 300 ft., with lean-to, 30 ft. wide, at municipal airport, including repair and reconditioning department, to cost over $70,000.

Shell Oil Co., San Francisco, has plans for new storage and distributing plant at Ogden, Utah, where site has been purchased, to cost $60,000 with equipment.

Packard Motor Car Co. of Utah, East Second and South Temple Streets, Salt Lake City, local representative for Packard automobile, is planning call for bids for two-story service, repair and sales building, 165 x 165 ft., to cost $150,000 with equipment. Pope & Burton, Newhouse Building, are architects.

Pioneer Sand & Gravel Co., Seattle, is planning extensions and improvements, including increased storage and distributing facilities, conveying and other handling equipment, mechanical loaders, etc., to cost over $300,000.

Kimball-Krogh Pump Co., San Francisco, has been organized to take over and consolidate Kimball Pump Co., Inc., and Krogh Pump & Machinery Co., both with local plants. New company has arranged for a stock issue to total 41,000 shares, part of proceeds to be used for development.

City Council, San Francisco, is considering a budget of $898,675, for expansion and improvements at Mills Field municipal airport, of which $411,000 will be used for additional land and remainder for hangars, repair shop and other units. M. M. O'Shaughnessy is city engineer, in charge.

Pacific Power & Light Co., Gasco Building, Portland, Ore., has plans for steam-operated electric power house on Wallowa Lake, near Joseph, Ore., to cost about $200,000 with equipment. Extensions will be made in transmission lines. H. H. Schoolfield, Portland, is chief engineer.

Foreign

A GROUP of industrial interests at Damascus, Syria, is organizing a company with capital of $440,000 to construct and operate a local cement mill. Information and prices of American-made machinery are desired for plant of about 200 tons daily capacity, quotations c. i. f. Beirut, and including services of expert to supervise installation. Machinery is estimated to cost $115,000. Information at office of Bureau of Foreign and Domestic Commerce, Washington, reference Syria No. 305021.

Soviet Weak Current Trust of Soviet Russian Government, Moscow, is planning construction of six plants to manufacture telephone, telegraph and X-ray apparatus, each to cost more than $1,000,000 with equipment. I. F. Antukhin, chairman of Trust, and N. N. Tziklinsky, chief radio engineer, are now on visit to United States for plant inspections and technical information. Amtorg Trading Corporation, 261 Fifth Avenue, New York, is official buying agency for Soviet Union.

J. M. Newton Vitreo-Colloid, Ltd., Oxted, England, has purchased local site for new plant to manufacture chemical products and will soon begin erection, to cost over $300,000 with equipment.

Ford Motor Co. of France, Paris, has disposed of stock issue totaling $2,000,000, a part of fund to be used for plant expansion for automobiles and tractors. It is now operating two assembling plants in France, one near Paris and other at Bordeaux, and it is understood that proposed increase will be carried out at these works. Company recently arranged for increase in capital from $78,000,000 to $100,000,000.

Polish Ministry of Commerce, Warsaw, Poland, has donated land for a new oil refinery at Gdynia, on Baltic Sea, to be carried out by a new company now being organized at Danzig, under direction of Government department noted. It will cost about $1,000,000. Completion is scheduled within 15 months.

United Electric Service Co., Milan, Italy, has authorized increase in capital from 250,000,000 to 350,000,000 lire, part of fund to be used for acquisition of Societa Di Electtricita Umbra, operating at Perugia, Italy, and extensions and improvements in power plants and transmission lines.